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UNION CARBIDE CORPORATION 39 OLD RIDGEBURY ROAD, DANBURY, CT 06817-0001

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September 29, 1992

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RETURN RECEIPT REQUESTED

8EHQ-92-12837
8892001092

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Office of Toxic Substances
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

92 OCT -7 AM 8:05

Attn: Section 8(e) Coordinator (CAP Agreement)

Re: CAP Agreement Identification No. 8ECAP-0110

Dear Sir or Madam:

Union Carbide Corporation ("Union Carbide") herewith submits the following report pursuant to the terms of the TSCA §8(e) Compliance Audit Program and Union Carbide's CAP Agreement dated August 14, 1991 (8ECAP-0110). This report summarizes results from toxicology investigations over many years, including pre-1977, of acute, short-term or range finding tests on surfactant products. These are mostly in the TERGITOL® Surfactant series, which is the trade name Union Carbide uses for its surfactant products.

On October 13, 1987, Union Carbide submitted a report to the Agency under §8(e) of TSCA which summarized a review of previous toxicity tests on TERGITOL® chemicals in which either or both the following phenomena were observed: delayed deaths or effects in lungs in the test animals from dermal application of the surfactants. This report was assigned docket number 8EHQ-1087-0696. Subsequently, Union Carbide sent supplemental reports to that submission on tests of about 34 additional surfactants and related materials in which similar observations were made.

During the CAP review process, Union Carbide officials placed a telephone call (Sept. 15, 1991) to Mr. D. R. Williams of the EPA 8(e) office requesting guidance for reporting earlier and other testing results on TERGITOL® products under the CAP program. Mr. Williams advised that the report by Union Carbide referred to above and a similar report submitted under the earlier Union Carbide 8(e) audit on April 22, 1988, sufficed to discharge the company's obligations to report lung effects and delayed deaths in the 100 or so reports summarized in

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Bushy Run Research Center Intramural Report 44-71, "Toxicity of TERGITOL® Materials to the Lung: A Retrospective Examination of Experimental Evidence," June 5, 1981. He further advised that the cover pages and summaries from those studies be submitted as supplemental under 8EHQ-1087-0696. Finally, Mr. Williams recommended that the TERGITOL® tests be reviewed for any "outlying" information, apart from the phenomena or observations in the "Retrospective Examination."

Enclosed is a Table summarizing the results of that review for all the acute, range finding, and short term toxicity tests on TERGITOL® and related surfactants found during the CAP process to be in Union Carbide's possession.[1] In this table the entry "N/A" means that the study did not cover that test or otherwise did not provide any information on it. This table does not include those studies which were submitted subsequent to Oct., 1987, supplemental to report 8EHQ-1087-0696. First pages and/or summaries of reports listed in the Table are included herewith. Complete copies of these reports are available upon request by the Agency.

The principal significant "outlying" phenomenon that was found in the review was eye injury from many of the surfactants. While it may be argued that the phenomenon is generally well known for most or all surface active agents, the data and first pages of reports are included here for the sake of completeness. Also, in reviewing the published literature on eye effects, it became apparent that not all the specific testing information was available in easily retrievable publications or compilations. In fact, there are many instances in which the phenomenon was reported in available literature for one or a few members of a class, but not for all members. The general phenomenon of maximum eye irritant effect at certain molecular weights or degrees of ethoxylation is quite well known for many nonionic surfactants, even though quantitative data are often lacking. In summarizing eye effects, the entry "GR 8" etc. refers to the grade in the so-called Draize test in vogue at the time; these standards tended to change, however, over the decades during which such tests were conducted, so the values or "tallies" should not be taken as absolute.

A second "outlying" phenomenon found in the review was an indication of neurotoxicity signs from certain nonionic surfactants, principally from percutaneous applications, although there were isolated instances of such observations in oral or inhalation studies. The signs were largely ataxia or unsteady gait, although tremors (one case), loss of hind leg coordination (one case), and "convulsed at one day" (one case) were reported also. These observations were made mostly in studies conducted since 1976 (this is probably due to the changes in protocol and/or practices in recording cage-side observations over the years, and should not necessarily be construed to infer that such phenomena did not occur in earlier studies). The observations were mostly at fairly high treatment levels such as 4 ,8 or 16 ml/kg, and it is frequently not possible from the published reports to conclude whether the signs were in moribund animals only or in both moribund and surviving animals. The findings are indicated in the footnotes to the attached table.

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[1]Other toxicity tests on TERGITOL® or other surfactant or related products such as subchronic, special tests, etc. were reviewed separately in the Union Carbide CAP process.

In its CAP process, Union Carbide used a guideline for consideration of reporting delayed deaths observed in experimental animals in short term tests as being, for a significant number of animals in the test group(s), > 5 days (peroral), > 10 days (cutaneous applications), and > 5 days (inhalation exposure). Test guidelines are not meant necessarily, in and of themselves, to become a basis for reporting; rather, they are used as a basis to review with other information (other toxicity data, exposure, status as being published or "widely known," etc.) on the chemical(s) in making reporting decisions.

The observations of effects on lungs was qualitative in nature; absence of entries in that column (N/A) does not imply that the effects did not occur; most often it signifies that the phenomenon was not examined in post mortem examinations, especially in earlier studies. Further, the imputations of lung effects, whether from oral and/or cutaneous treatment, were stated in various ways over the decades during which the tests were conducted. For purposes of the attached table, the notation, "Lung/yes" applies to observations variously stated as "lung congestion," "hemorrhagic" or "petechial hemorrhages," "congestion of thoracic viscera," "mottled lungs," and similar statements. The importance of reporting this information, as it was in the report under §8(e) referred to above, is related to the repeated number of times such observations were made, and should not be construed to imply that the choice of different words by the scientists who conducted these studies over a span of years necessarily connotes different phenomena.

Previous TSCA Section 8(e) or "FYI" Submission(s) related to this substance are:

8EHQ-1087-0696

Previous PMN submissions related to this substance are: (None)

This information is submitted in light of EPA's current guidance. Union Carbide does not necessarily agree that this information reasonably supports the conclusion that the subject chemical presents a substantial risk of injury to health or the environment.

In the attachments the term "CONFIDENTIAL" may appear. This precautionary statement was for internal use at the time of issuance of the reports. Confidentiality is hereby waived for purposes of the needs of the Agency in assessing health and safety information. The Agency is advised, however, that the publication rights to the contained information are the property of Union Carbide.

Yours truly,

William C. Kuryla, Ph.D.
Associate Director
Product Safety
(203/794-5230)

WCK/cr
Attachment (3 copies of cover letter, Table, and report first pages and/or summaries))

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Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
12-72	8/25/49	NPG RF	Nonylphenol ethoxylate	127087-87-0	Yes/Gr 10	No	Yes/Oral
13-52[a]	6/14/50	NPG	Nonylphenoxy polyethylene glycol	127087-81-0	Yes	N/A	N/A
14-5	12/15/50	Penetrant EH	2-Ethylhexyl sulfonate, sodium salt	N/A	N/A	N/A	N/A
14-44	5/3/51	NPG (Shampoo Samples) - 6% active	Nonylphenol ethoxylate	127087-87-0	Yes/Gr 9	N/A	N/A
14-46[b]	5/4/51	Dispersant NPG	Nonylphenol ethoxylate	127087-87-0	N/A	N/A	N/A
14-47	5/7/51	Hectograph ink remover cream with Dispersant NPG (2% active)	Nonylphenol ethoxylate	127087-87-0	N/A	N/A	N/A
15-15	2/4/52	Dispersant XC	*	*	No	N/A	N/A
15-20	2/15/52	NPX	Nonylphenol ethoxylate (10 moles)	127087-87-0	Yes/Gr 6	N/A	N/A
16-20	2/5/53	NPX (5 production samples)	Nonylphenol ethoxylate (10 moles)	127087-87-0	Yes/Gr 9	N/A	N/A
16-91[a]	10/21/53	Several surfactants	*	*	Yes	N/A	N/A
17-46[c]	4/7/54	Dispersant XC	*	*	No	N/A	No
17-101[a]	8/16/54	NP-x, TP-9	Nonylphenol ethoxylate	127087-87-0	Yes	N/A	N/A
17-104	8/31/54	NP-14	Nonylphenol ethoxylate (14 moles)	127087-87-0	Yes/Gr 8	N/A	N/A
17-107	9/9/54	NP-40	Nonylphenol ethoxylate (40 moles)	127087-87-0	No	N/A	N/A

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
17-112[d]	9/21/54	Anionic 7	*	*	N/A	N/A	N/A
17-117[e]	9/28/54	NP-27	Nonylphenol ethoxylate (27 moles)	127087-87-0	Yes/Gr 8	N/A	Yes/Oral & Skin
17-118	9/28/54	NP-35	Nonylphenol ethoxylate (35 moles)	127087-87-0	Yes/Gr 2	N/A	N/A
17-120[f]	10/11/54	Anionic 4	*	*	N/A	N/A	Yes/IV dogs
17-136[g]	11/22/54	Anionic 08	*	*	N/A	N/A	Yes/IV
22-19	4/9/59	TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	Yes/Gr 8	N/A	Yes/Oral
23-39	5/19/60	12-P-6	Dodecylphenol, ethoxylated	*	Yes/Gr 6	Yes/Skin	Yes/Oral
23-84	10/17/60	12-P-9	Dodecylphenol, ethoxylated	*	Yes/Gr 8	Yes/Skin	Yes/Oral
23-90	1/28/60	12-P-12	Dodecylphenol, ethoxylated	*	Yes/Gr 8	Yes/Skin	Yes/Oral
24-97[h]	11/6/61	TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	N/A	N/A	N/A
26-63[i]	7/8/63	TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	N/A	N/A	N/A
26-104[j]	10/25/63	XD	Oxirane, methyl-, polymer with oxirane, monobutyl ether	9038-95-3	N/A	N/A	N/A
26-108	1/18/63	TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	N/A	N/A	N/A
26-128[k]	12/13/63	OP-8	α-(Phenoxyheptaethyleneoxy) ethanol	9004-78-8	Yes/Gr 2	N/A	Yes/Oral
26-129	12/13/63	OP-15	α-(Phenoxytetradecylethyleneoxy) ethanol	9004-78-8	Yes/Gr 2	N/A	Yes/Oral

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
26-135	12/30/63	Nonionic of C_{11-15} secondary alcohol	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 9	N/A	Yes/Oral
26-136	12/30/63	Triethoxy C_{11-15} secondary alcohol, sodium sulfate	*	*	Yes/Gr 5	No	N/A
28-36	3/24/65	OP-15 starter	Ethylene oxide adduct of phenol	9004-78-8	Yes/Gr 7	N/A	N/A
28-88	6/30/65	15-S-S	*	*	Yes/Gr 8	No	No
28-92	7/12/65	15-S-4.6A	*	*	Yes/Gr 8	Yes/Skin	No
28-94	7/15/65	15-S-7	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 8	Yes/Skin	Yes/Skin
28-95	7/15/65	15-S-7 capped	*	*	Yes/Gr 5	Yes/Skin	Yes/Skin
28-96	7/15/65	15-S-13	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 8	No	No
28-97	7/15/65	15-S-15	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 3	No	Yes/Oral & Skin
28-98	7/21/65	15-S-20	Secondary alcohol ethoxylate	68131-40-8	Trace	Yes/	Yes/Oral[1]
28-99	7/21/65	15-S-40	Secondary alcohol ethoxylate	68131-40-8	Trace	No	No
29-10	2/8/66	Experimental Foamer # 3	*	*	Yes/Gr 7	No	Yes/Oral
29-11	2/9/66	Experimental Foamer # 2	Mixture of Experimental Foamer #3 & 15-S-3A	Mixture	Yes/Gr 7	No	Yes/Oral
29-13	2/24/66	XD 30	Oxirane, methyl-, polymer with oxirane, monobutyl ether	9038-95-3	Yes/Gr 2	Yes/Oral	Yes/Oral

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
29-14	2/25/66	XD 60	Oxirane, methyl-, polymer with oxirane, monobutyl ether	9038-95-3	Yes/Gr 2	No	Yes/Oral
29-63	7/26/66	15-S-3A, 62%	*	*	Yes/Gr 8	No	Yes/Oral & Skin
29-64	7/26/66	45-S-3A, 60%	*	*	Yes/Gr 8	No	Yes/Oral & Skin
29-65	7/27/66	45-S-3 TEA, (HP) 60%	*	*	Yes/Gr 8	Yes/Skin	Yes/Oral
29-66	7/28/66	45-S-3 TEA (C), 60%	*	*	Yes/Gr 8	Yes/Skin	Yes/Oral & Skin
29-124	1/5/67	Min-Foam	Alcohols, C_{11-15}- secondary, ethoxylated, propoxylated	68551-14-4	Yes/Severe	No	Yes/Oral & Skin
30-7	1/20/67	15-S-12	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 8	No	Yes/Oral & Skin
30-18	2/24/67	15-S-3S	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 9	No	Yes/Oral & Skin
30-41[m]	4/26/67	15-S-3	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
30-54[n]	6/6/67	15-S-3A	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
30-59[o]	6/14/67	15-S-7	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
30-60[p]	6/16/67	15-S-9	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
30-79	7/21/67	15-S-3 TEA	Mixture: Anionic surfactant & TEA	Mixture	Yes/Gr 8	No	Yes/Oral & Skin
30-102[q]	9/27/67	TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	N/A	N/A	N/A
30-127[r]	1/12/67	XD	Oxirane, methyl-, polymer with oxirane, monobutyl ether	9038-95-3	N/A	N/A	N/A
31-29[s]	2/19/68	NP-14	Nonylphenol ethoxylate (14 moles)	127087-87-0	N/A	N/A	N/A
31-41[s]	3/18/68	15-S-3	Secondary alcohol ethoxylate	68131-40-8	N/A	No	No
		15-S-7	Secondary alcohol ethoxylate	68131-40-8	N/A	No	No
		TP-9	Nonylphenol ethoxylate (9 moles)	127087-87-0	N/A	No	No
31-56	5/1/68	Min-Foam 1X	Alcohols, C_{11-15}-secondary, ethoxylated, propoxylated	68551-14-4	Yes/Mild	Yes/Skin	Yes/Oral & Skin
31-57	5/1/68	Min-Foam 2X	Alcohols, C_{11-15}-secondary, ethoxylated, propoxylated	68551-14-4	No	Yes/Skin	Yes/Oral
31-58	5/1/68	SPEEDWET	*	*	Yes/Mild	No	Yes/Oral
31-111[t]	9/9/68	15-S-15	Secondary alcohol ethoxylate	68131-40-8	N/A	No	No
31-112[t]	9/9/68	15-S-20	Secondary alcohol ethoxylate	68131-40-8	N/A	No	No
31-118[t]	9/13/68	TMN-10	Poly(oxy-1,2-ethandiyl), α-{3,5-dimethyl-1-(2-methylpropyl)-hexyl}-	60828-78-6	N/A	No	No

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
31-123	10/2/68	15-S-3	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 2	No	Yes/Oral (Skin N/A)
31-161	12/4/68	15-S-5	Secondary alcohol ethoxylate	68131-40-8	Yes/Gr 5	No	Yes/Oral & Skin
32-93	8/25/69	Fulling Agent 225	*	*	Yes/Gr 5	No	Yes/Oral
35-67[S]	9/25/72	Solid Surfactant S-55	*	*	N/A	N/A	N/A
36-9[S]	2/21/73	15-S-7	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
36-12	3/2/73	45-S-S	*	*	Yes/Gr 8	No	Yes/Skin
37-10[S]	3/29/74	13-S-5	*	*	N/A	N/A	N/A
		45-S-3	*	*	N/A	N/A	N/A
		45-S-10	*	*	N/A	N/A	N/A
		45-S-12	*	*	N/A	N/A	N/A
		TMN-3	Poly(oxy-1,2-ethandiyl), α-{3,5-dimethyl-1-(2-methylpropyl)-hexyl}-	60828-78-6	N/A	N/A	N/A
37-32	4-24-74	45-S-10	*	*	Yes/Gr 9	Yes/Oral	Yes/Oral & Skin
37-34	4-25-74	45-S-3	*	*	Yes/Gr 1	No	No

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
37-71	8-16-74	Anionic 08	Sodium 2-ethylhexyl sulfate (60% aqueous solution)	*	No	No	No
		Anionic 7	Sodium heptadecyl sulfate (74% aqueous solution)	*	No	No	No
38-8	1/16/75	15-S propionate (Surfactant ester)	*	*	No	No	No
38-119[S]	9/23/75	Cationic silicone 1973-68	*	*	N/A	N/A	N/A
		Cationic silicone 1973-63	*	*	N/A	N/A	N/A
		Cationic silicone 15S alcohol	*	*	N/A	N/A	N/A
		Cationic silicone LB 250	*	*	N/A	N/A	N/A
		Cationic silicone LB 385	*	*	N/A	N/A	N/A
38-125[S]	8/18/75	15-S-9	Secondary alcohol ethoxylate	68131-40-8	No	N/A	N/A
39-40	3/1/76	Sherlock Type GC concentrate	*	*	Yes/Severe	N/A	N/A
		15-S-9	Secondary alcohol ethoxylate	68131-40-8	Yes/Severe	N/A	N/A
39-94[U]	7/14/76	1214-9	*	*	Yes/Gr 8	No	Yes/Skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
39-95	7/14/76	1214-12	*	*	Yes/Gr 9	No	Yes/Oral & Skin
39-97[v]	7/22/76	1214-5	*	*	Yes/Gr 8	No	Yes/Oral & Skin
39-98	7/22/76	1214-7	*	*	Yes/Gr 7	No	No
39-104[w]	8/5/76	1214-3	*	*	Yes/Gr 6	Yes/Skin	Yes/Oral & Skin
40-17	2/8/77	25-L-3	Alcohols, C_{12-15}, ethoxylated	68131-39-5	No	Yes/Skin	Yes/Oral & Skin
40-19	2/23/77	25-L-9	Alcohols, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 5	No	Yes/Oral & Skin
40-20	2/23/77	25-L-5	Alcohols, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 5	Yes/Oral & Skin	Yes/Oral & Skin
40-21[x]	2/28/77	25-L-12	Alcohols, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 8	Yes/Skin	Yes/Oral & Skin
40-23	3/2/77	25-L-7	Alcohols, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 8	Yes/Skin	Yes/Oral & Skin
40-94	8/3/77	TX-115	*	*	Yes/Gr 8	Yes/Oral & Skin	Yes/Skin
40-97	8/8/77	LN-60	*	*	Yes/Gr 9	Yes/Skin	Yes/Skin
40-140	11/2/77	25-L-3 Sulfate	*	*	Yes/ Moderate	No	Yes/Oral & Skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
40-141[y]	11/11/77	15-S-3	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
		15-S-5	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
		25-L-5	Alcohols, C_{12-15}, ethoxylated	68131-39-5	N/A	N/A	N/A
		25-L-5	Alcohols, C_{12-15}, ethoxylated	68131-39-5	N/A	N/A	N/A
41-65	4/14/78	15-S-5, 2-ethylhexanoate	*	*	No	Yes/Skin & Oral	Yes/Oral
41-67	4/18/78	Nonylphenol (EO)6.5 (PO)8; 26QWD102	*	*	No	Yes/Skin	Yes/Oral & Skin
41-77	5/1/78	HDL 6559-21A	*	*	Yes	No	Yes/Oral
		Heavy Duty Liquid (HDL) Detergent 6658-29-11	*	*	N/A	N/A	N/A
		HDL 6559-21B	*	*	N/A	No	No
		HDL 6559-74A	*	*	N/A	N/A	N/A
		HDL 6559-74B	*	*	N/A	N/A	N/A
		HDL-E	*	*	N/A	N/A	N/A
41-82	5/11/78	Nonylphenol (PO)10 (EO)5	*	*	No	No	No
41-85	5/16/78	25-L-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 3	No	No
41-86	5/18/78	NEODOL 25-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 4	No	Yes/Oral & skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
41-101	6/19/78	25-L-3	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Trace	No	Yes/Oral
41-105	6/22/78	25-L-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 5	No	Yes/Oral & Skin
41-128[z]	9/7/78	25-L-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 8	Yes/Skin	Yes/Oral & Skin
41-130[aa]	9/18/78	25-L-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 8	No	Yes/Oral & Skin
41-158[s]	11/16/78	AG-1	*	*	N/A	N/A	N/A
		PM 5839	*	*	N/A	N/A	N/A
42-54[bb]	6/5/79	25-L-7	Alcohol, C_{12-15}, ethoxylated	68131-39-5	Yes/Gr 5	No	Yes/Oral & Skin
43-9	2/26/80	NP-6	Nonylphenol ethoxylate (6 moles)	127087-87-0	Yes/Gr 9	Yes/Oral & Skin	Yes/Skin
43-82[cc]	10/9/80	SF-2	Mixture: 70.1% Nonionic surfactant; 19.3% Aq. denatured ethanol; 10.6% Alkanolamines	Mixture	Yes/Gr 8	Yes/Skin	Yes/Skin
43-84	10/3/80	SC-1	*	*	Yes/Gr 8	Yes/Oral & Skin	Yes/Skin
43-85	10/3/80	MW-3	Surfactant: Alkanolamine - Alcohol - Water Mixture	Proprietary Blend	Yes/Gr 8	Yes/Oral & Skin	Yes/Oral & Skin
43-87	10/3/80	Alcohol Alkoxylate # 1	*	*	Yes/Gr 3	Yes/Oral & Skin	Yes/Skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
43-88	10/15/80	Alcohol Alkoxylate # 2	*	*	Yes/Trace	No	Yes/Skin
43-111[s]	10/31/80	TP-2 (PM 5916)	*	*	N/A	N/A	N/A
44-70	6/25/81	Experimental Nonionic Surfactant LF-05	*	*	Yes/Gr 4	No	Yes/Oral & Skin
46-85[dd]	8/2/83	24-L-60	Alcohols, C_{12-14}, ethoxylates	68439-50-9	Yes	Yes/Skin	Yes/Oral & Skin
46-103[ee]	9/23/83	NEODOL 25-7	*	*	N/A	N/A	N/A
		NEODOL 25-9	*	*	N/A	N/A	N/A
		15-S-7	Secondary alcohol ethoxylate	68131-40-8	N/A	N/A	N/A
		24-L-3	Alcohols, C_{12-14}, ethoxylates	68439-50-9	N/A	N/A	N/A
		24-L-4	Alcohols, C_{12-14}, ethoxylates	68439-50-9	N/A	N/A	N/A
		24-L-50	Alcohols, C_{12-14}, ethoxylates	68439-50-9	N/A	N/A	N/A
		24-L-60 (2)	Alcohols, C_{12-14}, ethoxylates	68439-50-9	N/A	N/A	N/A
		24-L-92 (2)	Alcohols, C_{12-14}, ethoxylates	68439-50-9	N/A	N/A	N/A
46-115[ff]	10/4/83	24-L-50 NMW	Alcohols, C_{12-14}, ethoxylates	68439-50-9	Yes	Yes/Skin	Yes/Oral & Skin
46-143	1/4/84	24-L-98 NMW	Alcohols, C_{12-14}, ethoxylates	68439-50-9	Yes	Yes/Skin	Yes/Oral & Skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
47-41[gg]	4/19/84	Detergent Powder Samples (10640-10-1 thru 10640-10-6)	*	*	Yes/All Samples	N/A	N/A
47-66[hh]	5/11/84	24-L-3 NMW	Alcohols, C_{12-14}, ethoxylates	68439-50-9	Yes	Yes/Skin	Yes/Skin
47-96[gg]	6/26/84	Detergent Powder Samples (10640-10-7 thru 1040-10-11)	*	*	Yes/All Samples	N/A	N/A
48-177	1/20/86	Hyflow SuperCel/ 24-L-98N Surfactant Filter Cake (60% in water)	*	*	Yes/ Moderate	No	Yes/Oral & Skin
50-160[ii]	2/2/88	UCAR Prewash Spotter (PWS), PM 5076	Alcohol C_{11-15}, ethoxylated plus high molecular weight hydrocarbon	N/A	No	Yes/Skin	Yes/Oral & Skin
51-3[jj]	6/28/88	Mechanical Dishwashing Surfactant	*	*	N/A	N/A	N/A
51-24	6/6/88	24-L-60N	Alcohols, C_{12-14}, ethoxylated	68439-50-9	N/A	No	No
51-115	11/18/88	Alfonic Ether Sulfate 1412-80	Alcohol ether sulfate	68891-38-3	No	No	Yes/Skin
52-69[kk]	6/12/89	Alfonic 1412-40	Alcohol ether sulfate	68891-38-3	Yes	Yes/Skin	Yes/Oral & Skin

Bushy Run Report ID	Date	TERGITOL® Surfactant or Surfactant Material Tested	Chemical ID	CAS #	Observation		
					Eye Irritation	Delayed Deaths	Lung Effects
52-104	12/21/89	(1-Dodecanol + 0.6 EO kettle product) sulfate	*	*	Yes	N/A	N/A
		1-Dodecanol sulfate	*	*	No	N/A	N/A
		(1-Dodecanol + 0.6 EO) sulfate	*	*	No	N/A	N/A
		26-L-3 sulfate	*	*	No	N/A	N/A
		P&G CO 1214 alcohol sulfate	*	*	No	N/A	N/A
53-83[ll]	9/19/90	UCON Lubricant Samples	*	*	N/A	N/A	N/A
54-1[mm]	2/20/91	24-L-60N	Alcohols, C_{12-14}, ethoxylated	68439-50-9	N/A	N/A	N/A
54-80[nn]	8/22/91	Solvactant 7 Solvent	CBI	CBI	N/A	N/A	N/A
54-89	10/11/91	Solvactant 7 Solvent	CBI	CBI	Yes	Yes/Skin	Yes/Skin
54-90	6/24/91	Solvactant 7 Solvent	CBI	CBI	No	N/A	N/A

a. This is an eye healing time study.

b. 14-46 is a 90-day dietary study. (See NOTE below.)

c. 17-46 is an acute, subacute (including 90-day), and percutaneous study of Dispersant XC.

d. Anionic 7 in study 17-112 was lethal at 1 g/kg via intravenous in dogs; it appeared to be a CNS depressant before death.

e. NP-27 in study 17-117 produced tremors in moribund animals at 7.95 ml/kg; LD_{50} = 3.7 ml/kg.

f. 17-120 is a pharmacologic screen of Anionic 4 via intravenous and intraperitoneal.

g. 17-136 is a pharmacologic screen of Anionic 08 by intravenous and intraperitoneal using rats and dogs.

h. 24-97 is a three-month dietary (rats) study of TP-9. (See NOTE below.)

i. 26-63 is a two-year feeding (rats) study of TP-9. (See NOTE below.)

j. 26-104 is a two-year dietary (dogs) study using XD. (See NOTE below.)

k. 26-108 is an LD_{50} study via peroral, subcutaneous, intraperitoneal and intravenous of TP-9.

l. No necropsies were performed for the percutaneous study (BRRC 28-99).

m. 30-41 is a three-month feeding (rats and dogs) study of 15-S-3. (See NOTE below.)

n. 30-54 is a three-month feeding (rats and dogs) study of 15-S-3A. (See NOTE below.)

o. 30-59 is a three-month feeding (rats and dogs) of 15-S-7. (See NOTE below.)

p. 30-60 is a three-month feeding (rats and dogs) of 15-S-9. (See NOTE below.)

q. 30-102 is a mouse skin painting tumorigenicity study of TP-9. It was determined during the CAP review process that there was no evidence for a chemical carcinogenic potential and that TP-9 was not a promoter.

r. 30-127 is a mouse skin painting study of XD. In the CAP review process, it was decided to forward this report to EPA because of evidence for promotional activity.

s. This and other noted studies were for purposes of determining LD_{50} data or skin corrosivity only, principally for MSDS warning purposes. They did not produce other kinds of data. They are included in this report for completeness.

t. 31-111, 31-112 and 31-118 are seven-day (rat) dietary studies of 15-S-15, 15-S-20 and TMN-10, respectively. (See NOTE below.)

u. In study 39-94 using 1214-9, the following observations were reported: 1) skin - at 4 ml/kg, one had convulsions at 24 hours, two of four died; 2) oral - at 4 ml/kg, four of five died and unsteady gait and sporadic convulsions were reported.

v. In study 39-97 using 1214-5, the following observations were reported: at 4 ml/kg, two of five died and there was loss of muscular coordination; animals were prostrate and convulsed at one day.

w. In study 39-104 using 1214-3, the following observations were reported: oral - unsteady gait at all levels including 4 ml/kg where no animals (of five) died.

x. In study 40-21 using 25-L-12, unsteady gait was observed at both 16 ml/kg and 4 ml/kg of the oral administration. Five of five and four of five animals died, respectively.

y. 40-141 is a repeated skin application study of several related surfactants. (See NOTE below.)

z. In study 41-128 using 25-L-7, ataxia was observed at 2 days after pecutaneous application with death at 3 days.

aa. In study 41-130 using 25-L-7, ataxia was observed in 2 of 4 animals at 48 hours and one of 4 animals at 72 hours; animals died at 3 and 4 days.

bb. In study 42-54 using 25-L-7, unsteady gait was reported at both 4 ml/kg and 2 ml/kg.

cc. In study 43-82 using SF-2, hypoactivity, ataxia, prostration were observed during an acute inhalation study; no animal died.

dd. In study 46-85 using 24-L-60, unsteady gait was observed at 0.5 ml/kg and 0.25 ml/kg.

ee. 46-103 is a skin irritation study on several surfactants. (See NOTE below.)

ff. In 46-115 using 25-L-50 NMW, tremors were observed following oral adiministration at 4.0 ml/kg; unsteady gait was observed following percutaneous application at several dose levels

gg. 47-41 and 47-96 are irritation (eye and skin) of multiple detergent powder samples.

hh. In 47-66 using 24-L-3 NMW, unsteady gait was observed following oral administraton of 8 ml/kg and following percutaneous application of 2 ml/kg.

ii. In 50-160 using Prewash Spotter, unsteady gait and loss of hind leg coordination was observed after percutaneous application of 5.66 ml/kg.

jj. Study 51-3 using Mechanical Dishwashing Surfactant was a 9-day repeated skin application study. (See NOTE below.)

kk. In 52-69 using Alfonic 1412-40, unsteady gait was observed after percutaneous application of 4 ml/kg.

ll. 53-83 is an intravenous study using UCON lubricant samples. (See NOTE below.)

mm. 54-1 is a pharmacokinetic study. (See NOTE below.)

nn. 54-80 is a genotoxicological study (Ames test) using Solvactant 7 Solvent. (See NOTE below.)

NOTE: Subchronic feeding studies on the TERGITOL® Surfactants and related products were conducted for purposes other than to determine acute effects of possible concern. They generally were conducted with significantly lower amounts in terms of mg/kg or ml/kg of animal body weight. Thus, they were not designed to and therefore did not result in findings such as lung effects, eye injury, or delayed deaths. In fact, the most common findings consisted of the establishment of levels where body weight gain effects began to be seen, which were often correlated with food intake data. Reference to the reports of such studies is made here for purposes of completeness.

* indicates that the chemical identity of the sample was not readily available or unable to be determined from older records. In some instances, CAS numbers have not been assigned because of the generic description.

N/A indicates that the study did not include the type of testing that would yield the effects being considered in this table.

Gr is an abbreviation for Grade. The grading system is one that was commonly used throughout the period, was based on the Draize eye scoring system, and is scaled from 1 (mild) to 10 (severe).

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Report 12-72

R: 8-25-49

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

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SPECIAL REPORT

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on

Date of mailing 9-1-49

Range Finding Tests on Nonylphenoxy Polyethylene Glycol

Tables of Protocols Attached

Carbide and Carbon Chemicals Corporation Industrial Fellowship No. 274-12

Summary

Nonylphenoxy polyethylene glycol is a compound of moderate acute oral toxicity with a R.F. LD_{50} of 2.82 (1.77 to 4.53) gm./kg. It is twice as toxic as "Tergitol" 7, and 10 or more times as toxic as the methoxy polyethylene glycols 750, 550, and 370.

It readily penetrates rabbit skin as evidenced by an LD_{50} of 1.66 (0.84 to 3.30) ml./kg., for the 24-hr. application to the clipped trunk under "Vinylite" sheeting. The methoxy polyethylene glycols have LD_{50}'s by this route >20.0 ml./kg.

When applied without a covering to the clipped skin of the rabbit belly in the vesicant test, it is no worse than dimethyl phthalate - an acceptable insect repellent.

In contrast to its minor activity on the skin, is the fact that it severely damages the cornea of the rabbit eye in a 1% dilution in propylene glycol. Care must be exercised to prevent eye burns as its action on the eye is comparable to that produced by maleic anhydride.

Sample

A sample of nonylphenoxy polyethylene glycol (PEG) which is proposed for use as a wetting agent, detergent, or emulsifier was sent to us on 5-19-49 by B. T. Freure of S. Charleston for toxicological tests.

Single Oral Doses

The R.F. LD_{50} for male albino, Sherman strain, non-fasted rats fed a 20% aqueous dilution by stomach tube and observed for 14 days thereafter is 2.82 (1.77 to 4.53) gm./kg. Symptoms immediately following the dose included prostration and narcosis, and in some instances death within 4 hours. Autopsies revealed hemorrhagic lungs, congestion of liver and kidneys, and gastrointestinal tract irritation. For comparison the LD_{50} for "Tergitol" 4 (25% solids) is 4.75 gm./kg., "Tergitol" 7 (25% solids) 5.66 gm./kg., and for "Tergitol" 08 (40% solids) 10.32 gm./kg. Related compounds such as methoxy PEG 750, 550, and 370 have R.F. LD_{50}'s of 40, 40, and 22 gm./kg. respectively.

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R: 6-14-50

Report 13-52

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SPECIAL REPORT

on

Healing of Rabbit and Dog Eyes Dosed with Nonyl Phenoxy PEG-101 and Comparative Materials

Tables of Protocols Attached

Carbide and Carbon Chemicals Division of U.C.C. Industrial Fellowship 274-13

Summary

In order to extend previous work performed in this laboratory on the healing time associated with corneal injury produced by nonyl phenoxy PEG and "Glim", rabbit and dog eyes were dosed with 0.1 ml. undiluted NPG or "Glim", with 0.5 ml. of 5% or 0.1% aqueous solutions of these surface active agents, or with approximately 20 mg. of "Ivory Snow" or "Tide" dust. The injury was more severe to the eyes of the rabbits than to those of the dog with undiluted or 5% solutions as well as with the powdered detergents. The 0.1% solutions did not injure the eyes of either species. The injuries that were produced healed within 2 weeks on the eyes of the dogs and within 8 weeks on the eyes of the rabbits. Thus, no permanent damage resulted when these corneal burns were untreated.

The corneas of dogs are closer to those of humans than are rabbit corneas. Accordingly, results with dogs are a better index of human response than are results with rabbits. With undiluted NPG-101 and "Glim" dog eyes were more severely injured than they were by dust of "Tide" or "Ivory Snow" and they returned to normal more slowly. However, no permanent injury resulted despite the absence of any attempt at removal or treatment. For a few days the injury was spectacular but it vanished fairly soon. Presumably infection during recovery might have complicated the picture, as did occur with one rabbit.

Sample

The nonyl phenoxy PEG (NPG-101) sample used in these tests was received 5-19-49 from Dr. Freure of South Charleston. It bore the identification number 205RD42.

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Report 14-5

R: 12-15-50

LL6 1/4 51

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SPECIAL REPORT

on

Range Finding Tests on "Tergitol" Penetrant EH

Tables of Protocols Attached

Carbide and Carbon Chem. Div., U.C.C. Industrial Fellowship No. 274-14

Summary

This compound has an extremely low order of acute toxicity for rats by mouth as evidenced by an R.F. LD_{50} of 25.8 (19.7 to 33.9) ml./kg. for the undiluted chemical.

By estimation, based upon the results with 5 rabbits, the R.F. LD_{50} for the undiluted compound will fall between 10 and 20 ml./kg. by skin penetration.

Substantially saturated vapor generated at room temperature is not lethal to rats exposed for an 8-hour period. The hazard by the respiratory route is slight.

On rabbit skin, "Tergitol" penetrant EH is no more irritating than undecanol and only half as irritating as "Tergitol" 4 and 7.

Eyes of rabbits are severely burned by 0.1 ml. amounts of the undiluted compound but the majority heal within 72 to 96 hours; whereas after moderate injury with 0.02 ml. amounts healing is complete in 48 hours. The compound is therefore in Grade 4 for eye injury hazard.

"Tergitol" penetrant EH is the least toxic as well as the least irritating of any of the so-called "Tergitol" wetting agents.

Sample

At the request of Dr. T. W. Nale a pint of "Tergitol" Penetrant EH (2-ethylhexyl sulfonate, sodium salt) was procured from S. Charleston on 10-23-50 for toxicological study. The sample was identified by No. S-63097.

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Report 14-44

R: 5-3-51

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SPECIAL REPORT

on

The Toxicity of an Amine Soap Shampoo Concentrate containing 6% "Tergitol" NPG

Carbide and Carbon Chemicals Div. of U.C.C. Industrial Fellowship No. 274-14

Tables of Protocols Attached

Summary

The LD50 for male albino rats fed the undiluted concentrate by stomach tube is 25.8 (19.7 to 33.9) ml./kg. On the basis of this finding the concentrate is considered safe as regards the possibility of accidental swallowing.

A 1 + 1 dilution of the concentrate in water caused no reaction worse than moderate erythema when applied to the clippied skin of the rabbit belly in single 0.01 ml. amounts. Repeated applications (3 x 0.025 ml. in 6 hours) demonstrated that a 1 + 1 aqueous dilution was no more irritative than "Kreml" of "Drene" but decidely worse than "Halo".

Five per cent aqueous dilutions caused severe but not permanent corneal damage while 1% dilutions were substantially harmless to rabbit eyes. These reactions demonstrate a slightly more severe effect upon eyes than "Tergitol" 4 and 7.

The inunction of groups of rabbits, 5 days per week for 30 days with 2.0, 1.0 and 0.0 ml./kg. of the 1 + 1 aqueous dilution of amine soap shampoo concentrate resulted in no statistically significant differences between the water treated controls and the groups inuncted with the shampoo. The criteria of effect used for this evaluation were: mortality, weight change, and histopathological examintion of kidney, liver, lung and skin.

Gross observation of the inuncted area revealed severe skin injury at the outset of treatment as evidenced by marked redness and cracking or fissuring of the skin. The severity of these reactions decreased as the inunctions continued but the skin never returned to normal during the period of treatment. The rabbit treatment was more severe than human use of the shampoo because one hour elapsed after application before removal or dilution of the material.

It is judged that human use of a shampoo based on the concentrate would be harmless, although some irritation of particularly sensitive scalps would be expected and splashing in the eye would be painful.

Sample

Two quarts of amine soap shampoo concentrate were submitted, on 12-11-50, by Miss Helen Wassel for toxicity evaluation. The composition of the shampoo formulation was as follows:

	Parts by Weight
Oleic acid	560
Cocoanut oil fatty acid (combining weight 212)	424
Propylene glycol	550
Triethanolamine	286
Monoethanolamine	126

94 grams of the above plus 6 grams of "Tergitol" NPG were combined to form the concentrate.

Single Oral Dose

The LD_{50} for female albino rats fed the undiluted shampoo by stomach tube is 25.8 (19.7 to 33.9) ml./kg.

Thompson's method of calculating the median-effective dose (LD_{50}) was applied to the 14 day mortality data. Sherman strain, non-fasted rats 5 to 6 weeks of age and weighing 90 to 120 grams were dosed at levels differing by a factor of 2 in a geometric series. The rats were reared in our own colony on Rockland rat diet (complete).

Deaths occurred within 24 hours without any prior spectacular symptoms of distress. Autopsy of those dying revealed congestion of the lungs and intestines and stomach hemorrhages.

Nonyl phenoxy polyethylene glycol or "Tergitol" NPG has a comparable LD_{50} value of 2.8(1.8 to 4.5) gm./kg. for rats. In contrast to the above the complete shampoo formulation has an extremely low acute oral toxicity and would be judged a safe item for household storage as regards the danger of accidental swallowing.

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Report No. 14-46

R: 5-4-51

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SPECIAL REPORT

on

The Subacute Oral Toxicity of "Tergitol" Dispersant NPG

Carbide and Carbon Chemicals Division of U.C.C. Industrial Fellowship 274-14

Tables of Protocols Attached

Summary

When fed in the diet of Sherman strain albino rats for 90 days, 1% of "Tergitol" Dispersant NPG produced statistically significant depression of body weight change as well as increase in mean liver weight of the data of the male, female, and of both sexes of the rats combined when compared to those of the controls. No mortality or micropathological changes of the small intestine, liver, or kidney was associated with the doses given in this study. The "no-effect" level for this subacute experiment is between 0.25% and 1.0% of the total diet of the rats. Therefore, as indicated by the summary table 12-149 of Report 12-61 (dated 7-29-49), "Tergitol" NPG is approximately equivalent in subacute oral toxicity to "Tergitol" 08, 4, and 7, and about 10 times less toxic than "Tergitol" P-28. It should be noted that the studies on these other "Tergitols" were of 30 days duration as compared to the 90 doses of this NPG study.

Sample Used

A one-gallon sample of "Tergitol" Dispersant NPG (NPG) was received 12-15-50 from South Charleston. It was identified with the number S83006.

Previous Results

The results of range finding tests are recorded in our report number 12-72, dated 8-25-49. The LD_{50} for male albino, Sherman strain, non-fasted rats fed a 20% aqueous dilution by stomach tube was 2.82 (1.77 to 4.53) gm./kg. Autopsies of victims revealed hemorrhagic lungs, congestion of the liver and kidneys, and irritatio of the gastrointestinal tract. The NPG readily penetrated rabbit skin as evidenced by an LD_{50} of 1.66 (0.84 to 3.30) ml./kg. for the 24-hour application to the clipped trunk under "Vinylite" sheeting. Although the NPG produced only minor capillary injection on the clipped skin of the rabbit belly, it burned rabbit eyes severely; some of these burns healed slowly. The cornea of the dog was also injured by this dispersant but here the healing was more rapid.

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Report 14-47

R: 5-7-51

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SPECIAL REPORT

On

The Toxicity of a Hectograph Ink Remover Cream Containing 2.0% "Tergitol" Dispersant NPG

Tables of Protocols Attached

Carbide and Carbon Chemicals Division of U.C.C. Industrial Fellowship 274-14

Summary

Hectograph ink remover cream has an LD_{50} for female albino rats of 38.9 (25.3 to 59.8) ml./kg. fed the undiluted cream by stomach tube. This result identifies it as of an extremely low order of acute oral toxicity.

Its irritative effect on rabbit skin and eyes is no greater than that produced by the widely used insect repellent dimethyl phthalate.

Rabbits received 29 inunctions of either 1.0 or 2.0 ml./kg./day, of the undiluted cream, 5 days per week without developing any skin irritation. The cream was gently massaged into the hair-free skin of the belly for a 1 minute interval after which one-half of each group was freed of the material in 10 minutes and the other half after 60 minutes had elapsed. The shorter contact period was used to indicate hazard and the longer to measure toxicity. Neither group was adversely affected at either dosage level as regards skin irritation, body weight gain or histopathology of liver and kidney.

Sample

The hectograph ink remover cream used in this study was furnished by Miss Helen Wassel of Fellowship 155 on 1-3-51. The formulation of the cream is as follows:

	Parts by Weight
"Cellosize" hydroxyethyl cellulose WP-300	1.5
Propylene Glycol	41.0
Kaolin (light color - minimum iron)	2.0
"Tergitol" Dispersant NPG	2.0
Tetrasodium pyrophosphate	0.5
Hydrosulfite ($Na_2S_2O_4 \cdot 2H_2O$)	1.5
Water	51.5

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R: 2-4-52

Report 15-15

E.W.T. 2-12-52.

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SPECIAL REPORT

on

Range Finding Tests on "Tergitol" Dispersant XC

Tables of Protocols Attached

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-15

Summary

"Tergitol" XC has an LD_{50} for rats of 26.2 (21.4 to 32.0) gm./kg. when fed in single doses as a 25% or 33% aqueous solution. For rabbits, by the same route, the LD_{50} is above 31.6 gm./kg. Low oral toxicity was correlated with poor absorption from the gastrointestinal tract. "Ucon" fluids LB 60, 250 and 400 have corresponding LD_{50}s of 4.9, 9.2 and 15.2 gm./kg. respectively.

Contrary to anticipation, "Tergitol" XC is not hemolytic to red blood cells in 0.75% NaCl solutions containing as much as 25% of the compound.

Intravenously, the dispersant has a much higher toxicity than would be postulated on the basis of the oral findings. For rats by tail vein as a 10% solution in isotonic saline the LD_{50} is 0.43 (0.37 to 0.49) gm./kg.

Electrocardiograms on dogs receiving intravenous doses as high as 100 mgm./kg. revealed no arrythmias such as are attendant upon similar injection of polypropylene glycols 425, 1025 and 2025.

By skin penetration this compound is relatively toxic for it is rapidly absorbed directly into the blood stream. The LD_{50} is 2.12 (1.26 to 3.74) gm./kg. when applied for 24 hours under impervious sheeting as a 25% solution. This disconcerting fact makes it unsuitable for incorporation in cosmetics.

Inhalation by rats of a mist produced at 170°C. indicates that oxidized aerosol vapor mixtures are a moderate hazard for a 3-1/2-hour exposure killed all and 1 hour killed 2 of 6.

The molten (40°C.) dispersant is not irritating to rabbit skin or eyes.

Sample

Approximately one pound of "Tergitol" Dispersant XC was furnished by Dr. A. B. Steele on 10-23-51 and this was supplemented on 11-12-51 with a gallon from S. Charleston. Both samples bore the "Passed" No. S-44687 which means they were from the same production batch.

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Report 15-20

R: 2-15662

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SPECIAL REPORT

on

Range Finding Tests on "Tergitol" NPX

Tables of Protocols Attached

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-15

Summary

"Tergitol" NPX has an LD_{50} of 1.3 (1.0 to 1.7) gm./kg. when fed as a 10% aqueous dilution to rats. This value indicates oral toxicity to be twice that of nonyl phenoxy polyethylene glycol tested in 1949. Other comparisons will be found below.

Toxicity by skin penetration is substantially the same as was found for 1949 production. The LD_{50} for rabbits in contact with undiluted "Tergitol" NPX is 2.0 (1.4 to 3.0) ml./kg. This value is identical with that for "Tergitol" XC applied as a 25% aqueous solution. Pluronic F-68 (Wyandotte Chemicals Co.) caused no mortality at 5.0 gm./kg., the maximum dosage of a 25% solution that may be applied.

"Tergitol" NPX caused no irritation on the skin of the rabbit belly when applied undiluted.

Instillation of aqueous dilutions in excess, to rabbit eyes revealed moderate corneal damage from a 40% aqueous dilution but no injury from 15 or 5% dilutions. This upgrades the compound from 10 to 6, perhaps indicating a less powerful penetrating action.

Sample

Four 8-ounce bottles of "Tergitol" NPX, identified by Passed No. S-44995, were received on 12-6-51 from S. Charleston. Toxicity tests were requested by Dr. Nale and Mr. Conway.

Single Oral Doses

The LD_{50} for male albino rats fed a 10% aqueous dilution is 1.3 (1.0 to 1.7) gm./kg.

Thompson's method of calculating the median-effective dose (LD_{50}) was applied to the 14-day mortality data. Sherman strain, non-fasted male and female rats, 5 to 6 weeks of age and 90 to 120 grams in weight were dosed at levels differing by a factor of 1.26 or 2 in a geometric series. The rats were reared in our own colony and maintained on Rockland rat diet (complete).

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Report 16-20

R: 2-5-53

E.W.T. 2-9-53

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

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SPECIAL REPORT

on

Comparative Toxicity of November 1952 Production Batches of "Tergitol" NPX

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-16

The appended tabulations indicate only slightly different LD_{50} values for the 5 samples in the single oral dose test for rats using 10% dilutions in water.

Fair agreement between LD_{50}s for the undiluted samples by skin penetration on rabbits was also achieved. The sample that proved most toxic (15-347) did not show evidence of being different in any other tests and therefore the variation is not considered important.

No differences in irritation of rabbit skin in the single application test nor in the extent of damage to rabbit eyes was discovered.

The repeated application test, 3 times daily for 3 days showed no single reaction worse than moderate erythema and the mean scores indicate a general respons equivalent to moderate or marked capillary injection for the 5 new samples. The 1951 sample was more irritating for 3 of 5 rabbits reacted to this sample with moderate erythema and one with marked erythema 18 hours after the last application; the fifth rabbit had capillary injection.

The 5 new samples produced corneal damage to rabbit eyes at a concentration of 5% which did not heal within 7 days after the instillation of 0.5 ml. amounts. The 1951 sample produced no corneal damage at this concentration. The discrepancy between the more severe effect upon skin and lesser effect upon eyes with the 1951 sample cannot be explained.

Charles P. Carpenter

SENIOR INDUSTRIAL FELLOW

Charles P. Carpenter

Typed: February 5, 1953 - mek

Report 16-91

A. 10-21-53

XHG 19236-3

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Comparison of Healing Time of Rabbit Eyes after Instillation of Surfactants

(A review with some new results)

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-16

Summary

Results on rabbit eye healing time are reviewed, particularly as they concern surfactants, and some new data are tabulated for comparison with older data.

We obtain the same results with the current F.D.A. technic of testing as we did with our earlier, only slightly different, method. Where a comparison is possible, our results show a lower tolerated concentration than Draize reported.

There has been variation in results with different samples of "Tergitol" surfactant NPX. This leads us to believe that a single sample of any surfactant may fail to give a good picture of the usual eye hazard of the product.

Current tests on successive plant batches of NPX are not covered in this report.

Early Results

We have always relied upon prompt rabbit eye injury for grading the relative hazard of contact of chemicals with the eye. Our standard test determines the least volume or the least concentration of a chemical which produces a fairly well standardized severe corneal burn in the rabbit eye within 24 hours of application.

In about 1947 we became disturbed at the diversity of the chemicals we were assigning to the maximum hazard grades by this quantitative method. In particular, the hazard of surfactants appeared high by our test, but the scarcity of human injuries led us to believe the hazard of handling surfactants was less than that of handling acids, anhydrides and bases which our test placed in the same hazard grades. It appeared logical to believe that corneas apparently injured to an equal extent 24 hours after contact with different chemicals might return to normal in quite different times and that healing time would be useful in distinguishing between the hazards of different sorts of chemicals.

Confidential

R: 4-7-54

4-12-54

Report 17-46

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

The Acute and Subacute Oral and Percutaneous Toxicity of "Tergitol" Dispersant XC

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

The 1953 sample of "Tergitol" dispersant XC is somewhat less toxic than that of 1951. Both male and female rats survived the 25.2 gm./kg. oral dose of 25% solution of current production while the 1951 sample had an LD_{50} of 26.2 gm./kg.

Similarly, by skin penetration, rabbits survived the maximum dosage of 25% aqueous solution that can be applied. This means that 5.0 gm./kg. of the 1953 sample caused no deaths whereas the LD_{50} for the 1951 sample was 2.1 gm./kg.

The intravenous injection of 10 or 12.5% solutions in 0.75% NaCl in rats resulted in an LD_{50} of 0.60 (0.45 to 0.80) gm./kg. for the 1953 production sample and 0.36 gm./kg. for the 1951 sample. The assay of the 1951 sample was made in March of 1954.

Similarly, the intraperitoneal injection of the 1951 and 1953 samples show the latter sample to be somewhat better. The LD_{50}s are 0.57 (0.33 to 0.98) gm./kg. for 1953 "Tergitol" XC and 0.44 (0.24 to 0.81) gm./kg. for the 1951 sample. Both of these samples were assayed currently.

The quantitative similarity in toxicity between the intravenous and intraperitoneal routes is not a common finding. However, if one considers that a good surfactant will penetrate rapidly into the bloodstream from the peritoneal cavity - then the results are reasonable.

An aerosol or fog prepared from a 5% aqueous solution of "Tergitol" XC was harmless to rats that inhaled it for 8 hours. The concentration is expressed in terms of the amount of fluid nebulized per liter of air as an aerosol 0.6 to 4 micra in particle size - namely: 0.206 ml./liter.

Statistical evaluation of the criteria of effect studied while rats were maintained on diets containing 4.0, 1.0, 0.25, 0.06, and 0.0% of "Tergitol" XC in their diets for 90 days reveals that the highest level where deviation from the controls is within the usual range of variation lies between 0.25 and 1.0%

Inunctions of rabbits, 5 days per week, for 30 days with a 25% solution of "Tergitol" XC at levels of 0.5 and 0.25 gm./kg./day caused no changes in mean weight or in micropathology that deviated from the controls within the usual accepted range of variation.

Twenty-five percent solutions of "Tergitol" XC cause no skin irritation and in addition are harmless to rabbit eyes.

The above findings demonstrate a substantial improvement in the toxicity of "Tergitol" XC between the 1951 and 1953 samples.

Because of the rather high toxicity of "Tergitol" dispersant XC by various routes of injection we do not believe its safety has been demonstrated for applications involving contact with wounds or upon mucous membranes. However, this report shows toxicity by routes other than injection to be so low that many applications involving contact with intact skin and accidental eye contact are undoubtedly without hazard.

Sample

On 3-5-53 a quart sample of S-34826 was procured from Dr. A. B. Steele of Mellon Institute and on 6-1-53 seven 8 oz. bottles of the same lot were received from S. Charleston. This lot is representative of a 25,000 lb. run of "Tergitol" XC. Previous toxicity tests were presented in Report 15-15 of 2-4-52.

Single Oral Doses

Nine male and 4 female rats received 25.2 gm./kg. of a 25% solution in water by stomach tube in a single dose. All survived and the majority gained weight normally.

Carworth-Wistar, non-fasted rats, 5 to 6 weeks of age and 90-120 grams in weight were used. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete).

This result demonstrates an improvement in the product over the previous lot which had an LD_{50} of 26.2 gm./kg.

Skin Penetration

Male albino New Zealand strain rabbits, 3 to 5 months of age and averaging 2.5 kg. in weight were immobilized during the 24-hour skin contact period. Thereafter, the "Vinylite" sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period. The rabbits were procured locally and maintained on Rockland rabbit ration.

Three rabbits survived a dosage of 5.0 gm./kg. of a 25% aqueous solution of the 1953 sample which is the maximum dose that can be applied satisfactorily. The 1951 sample had an LD_{50} of 2.1 gm./kg. and a 1952 sample of 2.5 gm./kg. of 25% aqueous solutions - so this test also reflects improvement in toxicity.

Confidential

R: 8-16-54

Report 17-101

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Comparison of Healing Time of Rabbit Eyes after Instillation of "Tergitol" NPX or TP-9

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

The tables in this report bring up to date the results of rabbit eye healing studies on 20 batches of "Tergitol" NPX and 10 of TP-9. This is a continuation of our report Number 16-91, issued 10-21-53.

Two of the batches of NPX appeared less injurious to the eye than the 18 others. These were batch numbers 54 and 60. The plant analyses supplied to us are presented for each batch.

Considerable differences in eye effect were found for the various lot of TP-9 with batch numbers 2, 8 and 9 the most and that of number 7BS the least severe. The only apparent difference in the plant analysis data was the absenc of steaming in 7BS.

Current Results

The following is a tabulation of the current results of successive pl batches of "Tergitol" NPX and TP-9. These bring up to date the data compiled since our report Number 16-91, issued 10-21-53. The former report reviewed th early results this laboratory obtained on the use and development of this test the F.D.A. technic which is currently used (no eyes are washed after the insti tion, however) and the results obtained with various types of surfactants, including 8 different batches of NPX.

The analytical results listed in the Tables 17-200 and 201 were comp from correspondence from Mr. Trigaux to Drs. Smyth and Carpenter on September 28, 1953 and January 28, February 15 and June 1, 1954. The wetting test data from a letter of March 11, 1954 from E. J. Baxter to Dr. Carpenter and are pre in Table 17-202. The eye healing results are presented in the last two columr Tables 17-200 and 201.

Confidential

Report 17-104

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Range Finding Tests on "Tergitol" NP-14

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

"Tergitol" NP-14 has an LD_{50} for rats, fed the undiluted compound by stomach tube, of 4.3 (3.1 to 6.0) ml./kg. Similar assays show the values for "Tergitol" NPX, TMN-650 and TD-750 to be 1.3, 3.3 and 4.9 ml./kg. respectively.

Toxicity by skin penetration in rabbits is slightly greater. The value for NP-14 is 2.5 (1.0 to 6.6) ml./kg. while for the related compounds in the above mentioned order they are 2.0, 1.5 and 1.1 respectively.

Inhalation of an aerosol of a 1% aqueous dispersion caused no visible harm to 6 rats in an 8-hour inhalation period.

"Tergitol" NP-14 undiluted is practically non-irritating to rabbit skin. However, a 15% dispersion in water causes moderate damage to rabbit eyes similar to that produced by "Tergitols" 4 and 7. These burns heal within a week as do also those caused by instillation of 0.1 ml. of a 40% dispersion.

Sample

At the suggestion of L. D. Berger, Jr., a quart sample of "Tergitol" NP-14 identified by No. S 22450 was provided by R. H. Wolff of S. Charleston on 6-25-54.

Single Oral Doses

This undiluted nonionic surface active agent has an LD_{50} for rats of 4 (3.1 to 6.0) ml./kg. when fed by stomach tube.

Carworth-Wistar, non-fasted rats, 5 to 6 weeks of age and 90-120 grams weight were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). Thompson's method of calculating the median-effec dose (LD_{50}) was applied to the 14-day mortality data.

No symptoms of distress were noted after 1.0 ml./kg., sluggishness, sl respiration and proneness occurred after 2.0 ml./kg. and tremors and narcosis at 3.98 ml./kg. and above.

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R: 9-9-54
EWP 9-10-54.

Report 17-107

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Range Finding Tests on "Tergitol" NP-40

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

"Tergitol" NP-40 has an LD_{50} of 15.9 (10.1 to 24.9) gm./kg. when fed to rats by stomach tube as a 50% aqueous solution. This value may be compared with the LD_{50} of 4.3 gm./kg. for NP-14.

By skin penetration on rabbits the LD_{50} is 4.5 (2.5 to 8.2) ml./kg. for the undiluted, molten compound. Percutaneous toxicity is also less than that of "Tergitol" NP-14.

Rats tolerated 0.028 ml./liter of a 1% aqueous solution of "Tergitol" NP-40 in aerosol form for an 8-hour interval. Weight gains during the observation period of 14 days were normal.

The undiluted compound is not irritating to rabbit skin or rabbit eyes when single applications are made.

Sample

A quart sample of "Tergitol" NP-40, identified by S. Charleston Passed S-19565, was received on 6-25-54. The material was provided by R. H. Wolff upon the suggestion of L. D. Berger, Jr.

Single Oral Doses

The LD_{50} for rats, fed a 50% aqueous solution, is 15.9 (10.1 to 24.9) gm./kg.

Carworth-Wistar, non-fasted rats, 5 to 6 weeks of age and 90-120 grams in weight were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). Thompson's method of calculating the median-effecti dose (LD_{50}) was applied to the 14-day mortality data.

Autopsies performed on the rats that died promptly after a dosage of 31.6 gm./kg. revealed lung congestion with slight hemorrhage, congestion of the adrenal, mottling of the liver, some gastrointestinal irritation, increased

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Report 17-112

R: 9-21-54

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Pharmacological Screening of TERGITOL Anionic 7

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

This industrial chemical has been subjected to the qualitative pharmacological screening program upon which Report 17-22 is a comprehensive manual.

TERGITOL 7 is a parasympathomimetic-like compound which manifeats its pharmacological effects very rapidly when it is administered intravenously in dogs. Antidotes which may be advised include Epinephrine, articicial respiration, Ephedrine, Metrazol, intravenous fluids and supportive therapy. It is a central nervous system depressant, and death is initially due to respiratory cessation followed by circulatory collapse.

Sample

On 2-2-54, one 8-ounce sample of TERGITOL 7 (S-97462) was received from South Charleston Research Dept. for toxicological studies and pharmacological screening.

Negative Findings

In vivo, TERGITOL 7 did not demonstrate any of the pharmacological activities listed below in the dosages employed:

Anti-cholinesterase, 0.05-1.0 gm./kg. intravenously in dogs.
Parasympatholytic, 0.05-1.0 gm./kg. intravenously in dogs.
Sympathomimetic, 0.05-1.0 gm./kg. intravenously in dogs.
Adrenergic blocking agent, 0.05-1.0 gm./kg. intravenously in dogs.
Diuretic, 0.05-1.0 gm./kg. intravenously in dogs.
Antihistaminic, 0.1 gm./kg. intravenously in dogs.
3.0 gm./kg. interperitoneally in guinea pigs.
Curare-like, 0.1-0.4 gm./kg. intravenously in dogs.
0.1-3.0 gm./kg. intraperitoneally in rats.
Sedative, 0.1-3.0 gm./kg. intraperitoneally in rats.
Central nervous system stimulant, 0.05-1.0 gm./kg. intravenously in dogs.
0.1-3.0 gm./kg. intraperitoneally in rats.

Confidential

Report 17-117

R: 9-28-54

10/1/54

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Range Finding Tests on TERGITOL NP-27

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

The LD_{50} for rats, fed the undiluted compound by mouth in single doses, is 3.7 (2.4 to 5.6) ml./kg. Other TERGITOLS have LD_{50}'s in gm./kg. as follows: NP-14 4.3, NP-40 15.9, NPX 1.3, TMN-650 3.3, and TD-750 4.9.

By skin penetration on rabbits the undiluted chemical has an LD_{50} of 1.8 (0.5 to 6.0) ml./kg. TERGITOL NP-14 has a comparable value of 2.5, and NP-40 of 4.5 ml./kg.

Rats inhaled 0.025 ml./l. of an aerosol made by nebulizing a 1.0% aqueous dispersion in a "Vaponefrin" all glass nebulizer. A group of 6 adult male rats survived the 14-day observation period following the 8-hour exposure. Weight gains were normal.

The undiluted compound does not cause irritation of the skin of the rabbit belly when applied uncovered.

Instillation of this compound in rabbit eyes demonstrates it to be similar in activity to TERGITOLS 4 and 7. A concentration of 10% allowed healing of 5 rabbit eyes within 7 days after instillation of 0.1 ml. amounts.

Sample

A quart of TERGITOL NP-27 was received from S. Charleston on 6-25-54 under identification #S 19561. R. H. Wolff sent samples at the request of L. D. Berger, Jr.

Single Oral Doses

The LD_{50} for rats, fed the undiluted compound, is 3.7 (2.4 to 5.6) ml./k

Carworth-Wistar, non-fasted rats, 5 to 6 weeks of age and 90-120 grams weight were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). Thompson's method of calculating the median-effect dose (LD_{50}) was applied to the 14-day mortality data.

Confidential

R: 9-28-54

Report 17-118

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Range Finding Tests on TERGITOL NP-35

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

TERGITOL NP-35 has an LD_{50} of 4.0 (2.6 to 6.3) gm./kg. when fed as a 50% solution in water. Toxicity is substantially constant at about 4.0 gm./kg. for the NP-14, 27 and 35, but it jumps to 15.9 gm./kg. for the NP-40 as the series becomes more like the polyglycols.

This decrease in toxicity is less marked by skin penetration as NP-35 has an LD_{50} of 3.0 (1.8 to 5.0) ml./kg. while NP-40 is 4.5 ml./kg. and NP-14 and 27 have values of 2.5 and 1.8 respectively.

The inhalation of 0.029 ml./l. of an aerosol of a 1% aqueous solution was lethal to 1 of 6 rats exposed for 8 hours.

No skin irritation occurred when 0.01 ml. undiluted was applied uncovered to the clipped skin of the rabbit belly.

Moderate corneal damage resulted from the instillation of 0.5 ml. of the undiluted compound in rabbit eyes. These reactions place it in Grade 2 of the 10-grade rating system with dimethyl phthalate and CARBITOL. These same burns were completely healed 7 days after dosing.

Sample

On 6-25-54 a quart of TERGITOL NP-35 under No. S 32574 was received from S. Charleston at the request of L. D. Berger. Toxicity evaluation was recommended.

Single Oral Doses

The LD_{50} of TERGITOL NP-35, fed as a 50% solution in water, is 4.0 (2.6 to 6.3) gm./kg.

Carworth-Wistar, non-fasted rats, 5 to 6 weeks of age and 90-120 grams in weight were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). Thompson's method of calculating the median-effecti dose (LD_{50}) was applied to the 14-day mortality data.

Confidential

R: 10-11-54

Report 17-120

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Pharmacological Screening of TERGITOL Anionic 4

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

This industrial chemical has been subjected to the qualitative pharmacological screening program upon which Report 17-22 is a comprehensive manual.

TERGITOL 4 is initially a parasympathomimetic and this activity is promptly followed by a low grade sympathomimetic activity followed terminally by a slow decrease to an eventual cardiovascular failure. The problem of antidotes is one chiefly of supportive therapeutic measures which will maintain blood pressure and respiration. Epinephrine proved of value but refractivity to it would render it valueless before too long a period. Lung hemorrhage appears to be the principle pathological attendant hazard.

Sample

On 3-29-54, two 8-ounce samples of TERGITOL 4 (S-3294) were received from the South Charleston Research Dept. for toxicological studies and pharmacological screening.

Negative Findings

In vivo, TERGITOL 4 did not demonstrate any of the pharmacological activities listed below in the dosages employed:

Anti-cholinesterase, 0.06-0.3 gm./kg. intravenously in dogs.
Antispasmodic, 0.06-0.3 gm./kg. intravenously in dogs.
Adrenergic blocking agent, 0.06-0.3 gm./kg. intravenously in dogs.
Diuretic, 0.06-0.3 gm./kg. intravenously in dogs.
Antihistaminic, up to 2.5 gm./kg. intraperitoneally in guinea pigs.
Curare-like, 0.2-1.6 gm./kg. intraperitoneally in mice.
Sedative, 0.2-1.6 gm./kg. intraperitoneally in mice.
Central nervous system stimulant, 0.06-0.3 gm./kg. intravenously in dogs
0.2-1.6 gm./kg. intraperitoneally in mice.

Confidential

Report 17-136

R: 11-22-54

EW 11-23-54

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

on

Pharmacological Screening of TERGITOL Anionic 08

Carbide and Carbon Chem. Co., U.C.C. Industrial Fellowship No. 274-17

Summary

This industrial chemical has been subjected to the qualitative pharmacological screening program upon which Report 17-22 is a comprehensive manual.

TERGITOL 08 is a parasympathomimetic-like compound when administered intravenously to dogs. It is a respiratory stimulant, and the initial cause of death due to an overdose of the material is cardiovascular failure. Epinephrine proved very satisfactory in the maintenance of the cardiovascular system and Metrazol and artificial respiration were sufficient to sustain the respiration. Atropine is contra-indicated. Lung hemorrhage always preceded death and should be of diagnostic value.

Sample

On 3-29-54, two eight ounce samples of TERGITOL 08 (S-96106) were received from the South Charleston Research Dept. for toxicological studies and pharmacological screening.

Negative Findings

In vivo, TERGITOL 08 did not demonstrate any of the pharmacological activities listed below, in the dosages employed:

Anti-cholinesterase, 0.1-1.0 gm./kg. intravenously in dogs.
Antispasmodic, 0.1-1.0 gm./kg. intravenously in dogs.
Parasympatholytic, 0.1-1.0 gm./kg. intravenously in dogs. Although there was an occasional indication of a secondary parasympatholytic activity with lower dosages.
Sympathomimetic, 0.1-1.0 gm./kg. intravenously in dogs.
Adrenergic blocking agent, 0.1-1.0 gm./kg. intravenously in dogs.
Diuretic, 0.1-1.0 gm./kg. intravenously in dogs.
Antihistaminic, up to 5.0 gm./kg. intraperitoneally in guinea pigs.
Curare-like, up to 10.0 gm./kg. intraperitoneally in rats.
Sedative, up to 10.0 gm./kg. intraperitoneally in rats.
Central nervous system stimulant, up to 10.0 gm./kg. intraperitoneally in rats; up to 1.0 gm./kg. intravenously in dogs.

Confidential

Report 22-19

R: 4-9-59

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

ON

Range Finding Tests on TERGITOL TP-9

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-22

Summary

TERGITOL TP-9 has moderate acute oral toxicity for rats by single dose. The LD_{50} is 2.6 (2.1 to 3.2) ml./kg. undiluted. For comparison TERGITOL NPX has an LD_{50} of 1.3, 3-A6 2.1, NP-14 4.3 and XD 5.7 ml./kg. under like conditions of feeding.

By skin penetration on rabbits the LD_{50} is 2.8 (1.8 to 4.6) ml./kg. of undiluted TP-9. The compounds used for comparison with oral LD_{50}'s have values by skin of 1.0 ml./kg. for 3-A6, 2.5 for NP-14 and TERGITOL XD was not lethal at 20.0 ml./kg.

An 8-hour inhalation of vapor evolved at room temperature, by aeration of the compound, is harmless to rats. Mist and vapor evolved at 170°C was harmless in 4-hour inhalation period.

Skin irritation from uncovered applications on one rabbit belly is negligible Grade 2. Covered applications will cause erythema and perhaps necrosis on rabbits.

The results 24-hours after instillation in the rabbit eye are severe corneal damage from undiluted TP-9 and 15% aqueous dilutions but an excess of a 5% dilution causes only moderate damage. Grade 8.

Sample

A sample of TERGITOL TP-9 procured from South Charleston on 2-12-57 representing Analysis No. 12027 (S.G. 25°C 1.0580, 0.18% water, color PT-CO 7-1/2, pH 6.58, cloud point 54.8°C, 0.0026% ash) was used for this assay. DR. Dernehl requested that toxicity tests be run so that the information could be used in the safety booklet currently being written by Sales.

Confidential

Report 23-39

R: 5-19-60

1HF8

5-24-60

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

Range Finding Tests on TERGITOL Nonionic 12-P-6

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-23

Summary

Stomach Intubation, rat - LD_{50} = 2.6 ml./kg.
Skin Penetration, rabbit - LD_{50} = 5.0 ml./kg.
Uncovered Skin Irritation, rabbit - trace, Grade 2
Eye Injury, rabbit - moderate, Grade 5

TERGITOL nonionic 12-P-6 is moderately toxic by the peroral route of administration and has slight to moderate toxicity by skin penetration. Only trace injuries result from its application to the uncovered skin but rabbit eyes are moderately burned by 0.005 ml. undiluted and by 0.1 ml. of a 40% aqueous dispersion. All eyes were completely healed seven days after the instillation of 0.1 ml. of a 15% aqueous dispersion. Lack of sample precluded any possibility of inhalation tests but little hazard from breathing is anticipated under ordinary conditions.

In comparison with TERGITOL NPX, TERGITOL 12-P-6 is less toxic by skin penetration and less irritating to eyes. Another TERGITOL, nonionic NP-44, which is the condensation product of nonylphenol plus 40 mols of ethylene oxide, is essentially innocuous--64 ml./kg. killed only two of five rats by stomach intubation, rabbits survived 10 gm./kg. by skin penetration and only trace injuries result from eye and uncovered skin contact.

Sample

An eight-ounce quantity of TERGITOL nonionic 12-P-6 (GATX-69064) bearing identification DS-6-26-4 was received from South Charleston on January 25, 1960, at the request of E. P. Fisler. This material was identified as dodecylphenol plus six mols of ethylene oxide.

Single Peroral Doses

The LD_{50} for TERGITOL 12-P-6 is 2.59 (2.10 to 3.21) ml./kg. when administered to male albino rats in a single undiluted dose by stomach tube.

Dow-Wistar non-fasted rats, five to six weeks of age and 90-120 grams in weight, were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). The method of moving average for calculating the median-effective dose (LD_{50}) was applied to the 14-day mortality data.

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R: 10-17-60

1478

11-22-60

Report 23-84

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

Range Finding Tests on TERGITOL Nonionic 12-P-9

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-23

Summary

Stomach Intubation, rat - LD_{50} = 1.87 ml./kg.
Skin Penetration, rabbit - LD_{50} = 1.11 ml./kg.
Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - severe, Grade 8.

TERGITOL nonionic 12-P-9 is moderately toxic by both stomach intubation and skin penetration. Although the uncovered clipped rabbit skin is only slightly irritated upon application of the undiluted chemical, rabbit eyes are burned by instillation of 0.005 ml. amounts and by an excess (0.5 ml.) of a 15% aqueous solution. A 0.1 ml. amount of a 10% aqueous solution caused trace injury which healed completely within 48 hours. No hazard by inhalation is anticipated under normal handling conditions.

TERGITOL nonionic 12-P-9 is slightly more toxic by mouth and about five times as toxic by skin penetration as the recently tested TERGITOL 12-P-6 (dodecylphenol + 6 mols of ethylene oxide; Report 23-39; 1960). Neither material irritates the uncovered rabbit skin to a great extent but 12-P-9 is more injurious to the rabbit eye.

TERGITOL 12-P-9 is more toxic by mouth and by skin penetration than either TERGITOL NP-27 (Report 17-117; 1954) or TERGITOL NPX (Report 15-20; 1952, 21-35; 1958). None of the three is particularly irritating to the uncovered rabbit skin but all cause eye injury.

Sample

On June 5, 1960, four 8-ounce quantities of TERGITOL nonionic 12-P-9, each identified with Passed No. SA-14642, were received from South Charleston, West Virginia. A toxicological evaluation of this material, which is a condensation product of dodecylphenol plus 9 mols of ethylene oxide, was performed at the request of E. P. Fisler, New Chemicals.

Single Peroral Doses

TERGITOL nonionic 12-P-9 has a single dose LD_{50} of 1.87 (1.34 to 2.60) ml./kg. when administered undiluted to male albino rats by stomach intubation.

Report 23-90

GAW 11/28/

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

Range Finding Tests on TERGITOL Nonionic 12-P-12

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-23

Summary

Stomach Intubation, rat - LD_{50} = 1.30 ml./kg.
Skin Penetration, rabbit - LD_{50} = 1.77 ml./kg.
Erythema, slight necrosis.
Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - severe, Grade 8.

Undiluted TERGITOL Nonionic 12-P-12 is moderately toxic by both the peroral and skin penetration routes. Only minor irritation results from its application to the uncovered rabbit skin but rabbit eyes are burned by the instillation of 0.005 ml. amounts undiluted and by an excess of a 5% aqueous solution. Some eyes were not completely healed two weeks later. Although inhalation tests were omitted, little hazard is anticipated by this route under ordinary handling conditions.

The following is a table of data for comparing TERGITOL 12-P-12 with other previously tested TERGITOLS which may have similar uses:

ERGITOL onionic	Oral LD_{50}	Skin Penetration LD_{50}	Uncovered Skin Irritation	Eye Injury	Report Number
NPX	2.52 ml./kg.	2.0 ml./kg.	trace	severe	19-132, 15-20
NP-27	3.67 ml./kg.	1.78 ml./kg.	none	severe	17-117
NP-35	4.0 gm./kg. (as 50% aqueous solution)	3.0 ml./kg.	none	trace	17-118
12-P-6	2.59 ml./kg.	5.0 ml./kg.	trace	moderate	23-39
12-P-9	1.87 ml./kg.	1.11 ml./kg.	minor	severe	23-84
12-P-12	1.30 ml./kg.	1.77 ml./kg.	minor	severe	*This Report

Eye test results with Pennsalt Chemical Company's Nonic 218, a reaction product of dodecyl mercaptan with approximately 10 mols of ethylene oxide, were summarized in Report 23-82; 1960. According to these results, the instillation of 0.1 ml. of a 5% aqueous solution into five rabbit eyes caused moderate corneal injury which was not healed 14 days later. In comparing TERGITOL 12-P-12 with Nonic 218 data indicate that 12-P-12 is slightly less injurious to rabbit eyes than the 218 which has already gained acceptance for use in shampoo formulations.

Sample

Four 8-ounce quantities of TERGITOL Nonionic 12-P-12 were received from South Charleston, West Virginia, on August 25, 1960, and four days later four additional 8-ounce samples arrived. All were identified with Passed No. SA-17011. At the request of E. P. Fisler, a toxicity assay was performed on this material, which is described as the condensation product of dodecylphenol with 12 mols of ethylene oxide.

Single Peroral Doses

TERGITOL Nonionic 12-P-12 has an LD_{50} of 1.30 (1.05 to 1.60) ml./kg. when administered undiluted by stomach tube to male albino rats.

Dow-Wistar nonfasted rats, five to six weeks of age and 90-120 grams in weight, were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). The method of moving average for calculating the median-effective dose (LD_{50}) was applied to the 14-day mortality data.

A depressed state followed dosing with most deaths occurring within the next 24 hours. Gross examination at autopsy revealed congested and slightly hemorrhaged lungs, mottled livers with surface burns resulting from contact with stomachs containing the dose, congested kidneys and adrenals, and gastro-intestinal irritation.

Skin Penetration

By rabbit skin penetration, the LD_{50} is 1.77 (1.09 to 2.86) ml./kg. undiluted. Marked erythema and slight necrosis of the skin were found upon removal of the impervious plastic covering after the 24-hour contact.

Male albino New Zealand strain rabbits, three to five months of age and averaging 2.5 kg. in weight, were immobilized during the 24-hour skin contact period. Thereafter, the VINYLITE sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period. The rabbits were procured locally and maintained on Rockland rabbit ration. The moving average method of calculating the LD_{50} was used.

Confidential

Report 24-97

R: 11-6-61
HTAS
11-21-61

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

SPECIAL REPORT

Results of Incorporating TERGITOL TP-9 in the Diet of Rats for Three Months

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-24

Summary

A sample of 1960 commercial production of TERGITOL Nonionic TP-9 was blended in laboratory chow and fed to rats at concentrations of 1.25, 0.25, 0.05, 0.01 and 0.0% for a period of 94 to 97 days.

Ten male and ten female CFE albino rats were maintained on each of these concentrations. Several criteria of effect, elaborated upon in the text of this report, were affected adversely by the 1.25% and the 0.25% levels.

At 0.05% and at 0.01% the females ate less diet than did their counterparts among the controls. At 0.05% kidney weight as percentage of body weight was lower than the controls but as this is a finding of unknown significance which did not occur at the higher dosage levels, it has been charged to biological variation among rats and regarded as an artifact in testing. Tissues from the rats on the 0.05% level, upon histopathological examination, appear to differ little from those of the appropriate controls. The probable reduction in hepatic glycogen, as measured by the periodic acid-Schiff histochemical technique is not indicative of liver tissue damage but rather suggests a physiological stress to these cells.

It is concluded that rats can tolerate without ill-effect a dosage lying between 0.05 and 0.25% (500 and 2500 ppm.) of the entire diet during a 90-day period.

Sample

One gallon of TERGITOL nonionic TP-9 was received 8-10-60 from South Charleston. It was labelled "Passed S-373673".

Procedure

CFE rats were received 8-10-60 from Carworth Farms for use in this test. They were identified on 8-12 and were weighed twice a week until 8-26-60 when doses were started.

Only the rats whose body weights were within plus or minus two standard deviations from the mean weight of rats of their sex were accepted for the study. Any rats that had lost weight or that had poor tone during the preliminary observation period were rejected. Rats of each sex were randomized separately.

Confidential

Report 26-63

R: 7-8-63

7-9-63

MELLON INSTITUTE

Special Report

Two-Year Feeding of TERGITOL Nonionic TP-9 in the Diet of Rats

Union Carbide Chemicals Co., U.C.C. Industrial Fellowship 274-26

Table of Contents

Summary

Groups of 20 male and 20 female rats were maintained on diets containing 0.27, 0.09, 0.03 or 0.01% of TERGITOL Nonionic TP-9. Those that survived on the upper three dosage levels were killed for examination after two years while the survivors at the lowest level were killed after 1.5 years of doses because of lack of gross effect at the higher 3 levels. A control group was maintained under identical conditions but without the inclusion of the TERGITOL in the diet. Additional groups of 16 male and 16 female rats per dosage level, randomized from the same lot were maintained in parallel and were killed after 6 or 12 months to follow gross and micropathology. The results of the measurements of the following criteria of effect were examined statistically and evaluated toxicologically:

diet consumption
mortality and life span
incidence of infection
liver and kidney weight, as
  percentage of body weight
body weight gain
maximum body weight
hematocrit or Coulter erythrocyte count
incidence of neoplasms
incidence of pathological lesions

In none of these criteria did the TERGITOL-treated groups differ in a deleterious manner from their controls. While minor effects had been reported (Rpt. 24-97, issued 11-6-61) from 0.25% of TERGITOL TP-9 in a previous 90-day study on rats they were neither found at 6 or 12 months nor at any time throughout the 24 months of the current study. It is concluded that the highest level fed, 0.27%, was without deleterious effect on the health of rats when included in their diets for two years.

Sample

The following information on our 5-gallon sample, No. 24-7, of TERGITOL Nonionic TP-9 received 1-13-61 and used in the two-year feeding study to rats was supplied by Rader on 8-4-61, from South Charleston, West Virginia:

Analysis number	IS-002581
File	40D11
Sp. gr. at 20/20°C	1.0550
pH 10% in water	5.2
Cloud point of 0.5% solution, °C	52.8
Water, %	0.28
Ash, %	0.001
Color, Pt	10
Odor	Passes test
Suspended matter	Passes test

Chemical Hygiene Fellowship report number 26-31, issued 4-1-63 is a résumé of the characterization of a commerical sample of TP-9. The lower glycols, mono-, di- and tri- were identified and found present as trace, 0.5 and 0.01% concentrations respectively. About 0.25% free nonylphenol was determined. Adduct units present in quantities ranging from less than 1 to approximately 15% were tentatively estimated. The presence of polyethylene glycols was established. The above were determined through a combination of gas, paper and thin layer chromatography.

Confidential

Report 26-104

R: 10-25-63

GLW 10/30/63

MELLON INSTITUTE

Special Report

Two-Year Feeding of TERGITOL Nonionic XD in the Diet of Dogs

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-26

Table of Contents

Summary

Groups of six beagle dogs, 3 males and 3 females per group, received 0.27, 0.09 or 0.03% of TERGITOL Nonionic XD in their diets for two years, while a similar group received identical treatment and feed without the inclusion of the TERGITOL. The following criteria were examined and were found to be without statistically measurable deleterious effect: body weight change, mortality, terminal liver, kidney or heart weights as percentages of body weights, periodical hematological and biochemical determinations and microscopic condition of sections of all major organs. Chronic thyroiditis was observed with a similar incidence to that reported among untreated animals in four other beagle colonies, hence is not judged to be related to the chemical. Therefore, the dogs that consumed the highest dosage level fed; namely, 0.27% of TERGITOL XD, were apparently unaffected.

Sample

The following information on the sample of TERGITOL Nonionic XD used in the two-year feeding studies was supplied by B. Bott of South Charleston:

CHF sample number	24-9
Date received	1-13-61
Quantity	5 gallons
Analysis number	S-414738
pH of 10% aqueous solution	5.7
Water, %	0.25
Ash, %	0.004
Water solubility	Passes test
Freeze point, °C	29
Color, Pt	30
Cloud point, °C	74
Odor	Passes test

Procedure

The dogs, listed in Table 26-389, were either purchased from Oak Shadows Farm, Kalamazoo, Michigan or were bred in our laboratories. They were 6 to 12 months of age when they received their first dose of TERGITOL XD on 7-25-61. The surviving dogs were killed for examination between July 15, 1963 and July 16, 1963. The TERGITOL XD was mixed into the basic dry diet at concentrations of 0.27, 0.09, 0.03, or 0.00%. The basic diet, supplied in 50-pound bags, of all of the dogs was Friskies Dog Food Meal, a product of Carnation Company, Los Angeles, California. The formula of this diet changed slightly during the third month of the study. These formulae follow:

	Until 10-2-61	After 10-2-61
Crude protein, minimum	24.0	24.0
Crude fat, minimum	6.5	6.0
Crude fiber, maximum	4.5	5.0
Ash, maximum	11.9	10.0
N.F.E., minimum	40.0	not listed
Moisture, maximum	10.0	12.0

Confidential

Report 26-108

MELLON INSTITUTE

Special Report

Acute Toxicity of TERGITOL Nonionic TP-9

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-26

Summary

Peroral Administration reveals TP-9 to be a compound of moderate toxicity by this route with as much as a sevenfold variation between rodent species.

Parenterally for rats the subcutaneous LD_{50} is 1.0 ml./kg. with intraperitoneal and intravenous each 5 times as toxic as its predecessor.

Samples

With the exception of the rabbit work reported herein all of the testing was done on a 5-gallon quantity of TERGITOL Nonionic TP-9 received from South Charleston, West Virginia under Passed IS 002581 on January 13, 1961. It was procured for use in the 2-year rat feeding study and had been subjected to analysis at the Quality Control Labs in South Charleston. See data by Rader August 4, 1961, Ref. IS 002581 File 40D11.

Report 22-19 covers R.F. tests, 24-97 the 90-day rat feeding study, 26-63 the 2-year rat feeding study, 26-96 the 2-year dog feeding study, 26-77 method for column separation and 26-78 quantities and molecular weights of Carbowaxes in TP-9.

Table 26-404

Single Dose Toxicity of TERGITOL Nonionic TP-9

(Sample 24-7 received 1-13-61)

Species and Sex	Wt. Range Grams	Conc., 1 ml. = gms. in vehicle	LD_{50} and Range, or Mortality Ratio as Contained
		Peroral	
Rat, M	90-120	Undiluted	2.33 (1.67 to 3.25) ml./kg.
Rat, M	230-315	Undiluted	2.46 (1.88 to 3.23) ml./kg.
Rat, M	448-569	Undiluted	1.41 (No Range) ml./kg.
Rat, M	386-528	Undiluted	2.00 (1.28 to 3.13) ml./kg.
Rat, M	90-120	Undiluted	2.83 (1.77 to 4.53) ml./kg.
Rat, F	90-120	Undiluted	2.38 (1.68 to 3.38) ml./kg.
Mice, F	24-34	Undiluted	4.29 (3.07 to 5.98) ml./kg.
Guinea Pig, M	613-809	Undiluted	0.84 (0.59 to 1.18) ml./kg.
Rabbits, F	2766-4226	Undiluted	0.62 (0.28 to 1.37) ml./kg.*
Rabbits, M	2316-3612	Undiluted	0.62 (0.25 to 1.57) ml./kg.*
		Subcutaneous	
Rat, F	121-154	Undiluted	1.00 (0.64 to 1.57) ml./kg.
		Intraperitoneal	
Rat, F	122-203	Undiluted	0.210(0.129-0.342) ml./kg.
		Intravenous	
Rat, F	125-137	0.01 in 0.75% NaCl	0.044 (No Range) gm./kg.

* 1960 Sample

Confidential

Report 26-128

IMF-8
12-17-63

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL OP-8

(Ethylene Oxide Adduct of Phenol)

Chemicals Division, Union Carbide Corporation — Industrial Fellowship 274-26

Summary

Stomach Intubation, rat - LD_{50} = 6.17 ml./kg.
Skin Penetration, rabbit - 8 ml./kg. killed 0 of 4.
Inhalation, rat -
Concentrated vapor generated at approximately 24°C.
8 hours killed 0 of 6.
Uncovered Skin Irritation, rabbit - trace, Grade 2.
Eye Injury, rabbit - trace, Grade 2.

TERGITOL OP-8 has slight acute toxicity by both the peroral and skin penetration routes and presents no hazard by inhalation under normal handling conditions. The undiluted material is essentially nonirritating to rabbit skin and only slightly irritating to rabbit eyes.

TERGITOL OP-8 is much less toxic than either of its two components--phenol and ethylene oxide.

Sample

On August 19, 1963, an 8-ounce sample of TERGITOL OP-8, 2-(phenoxyheptaethyleneoxy) ethanol (16-DS-74-1) was received from South Charleston, West Virginia for toxicity assay as requested by Louis F. Theiling, Research and Development. This material is an adduct of ethylene oxide and phenol.

Single Peroral Doses

TERGITOL OP-8 has an acute LD_{50} of 6.17 (4.99 to 7.63) ml./kg. when administered undiluted by stomach intubation to male albino rats.

Carworth Farms-Elias nonfasted rats, 5 to 6 weeks of age and 90-120 grams in weight were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). The method of moving average for calculating the median-effective dose (LD_{50}) was applied to the 14-day mortality data.

Confidential

Report 26-129

IFD
12-17-63

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL OP-15

(Ethylene Oxide Adduct of Phenol)

Chemicals Division, Union Carbide Corporation — Industrial Fellowship 274-26

Summary

Stomach Intubation, rat - LD_{50} = 34.3 ml./kg.
Skin Penetration, rabbit - 16 ml./kg. killed 0 of 4.
Inhalation, rat -
Substantially saturated vapor evolved under static conditions at 21.5°C.
8 hours killed 0 of 6.
Uncovered Skin Irritation, rabbit - trace, Grade 2.
Eye Injury, rabbit - trace, Grade 2.

TERGITOL OP-15 is an essentially innocuous material. It has an extremely low order of acute toxicity by both the peroral and skin penetration routes and presents no hazard by inhalation under normal handling conditions. The undiluted chemical is practically nonirritating to rabbit skin and causes only slight irritation in the rabbit eye.

TERGITOL OP-15 is much less toxic than either of its two components--phenol and ethylene oxide. It is also less toxic than TERGITOL OP-8 (an ethylene oxide adduct of phenol) which was studied recently by this laboratory (Rpt. 26-128; 1963). A summary of toxicity data for TERGITOL OP-8 follows:

Stomach Intubation, rat - LD_{50} = 6.17 ml./kg.
Skin Penetration, rabbit - 8 ml./kg. killed 0 of 4.
Inhalation, rat -
Concentrated vapor generated at approximately 24,C.
8 hours killed 0 of 6.
Uncovered Skin Irritation, rabbit - trace, Grade 2.
Eye Injury, rabbit - trace, Grade 2.

Sample

On August 30, 1963, one gallon of TERGITOL OP-15 (167584) was received from South Charleston, West Virginia for toxicity assay as requested by E. B. Newton, Chemical Intermediates. This whitish liquid is an ethylene oxide adduct of phenol.

Confidential

R: 12-30-63

Report 26-135

IPS
1-2-64

MELLON INSTITUTE

Special Report

Range Finding Tests on Nonionic from C_{11} to C_{15} Secondary Alcohols

Chemicals Division, Union Carbide Corporation — Industrial Fellowship 274-26

Summary

Stomach Intubation, rat - LD_{50} = 2.38 gm./kg., 20% aqueous solution.
Skin Penetration, rabbit - LD_{50} = 2.00 ml./kg. (melted); 1.12 gm./kg., 20% aqueous solution.
Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - severe, Grade 9.

Nonionic from C_{11} to C_{15} secondary alcohols has moderate acute toxicity by both the peroral and skin penetration routes. This material caused only minor irritation on rabbit skin but, in the rabbit eye it produced moderately severe corneal necrosis in solutions as dilute as 5%. Eye contact should be avoided. Although no inhalation tests were done, no hazard is anticipated by this route under normal handling conditions.

This surfactant differs little in acute toxicity from the previously studied TERGITOL Nonionic TP-9 (Rpt. 22-19; 1959) and TERGITOL Nonionic NPX (Rpts. 15-20; 1952 and 16-20; 1953). For comparison, a summary of toxicity data follows:

Material	Peroral LD_{50}	Skin Penetration LD_{50}	Uncovered Skin Irritation	Eye Injury
TERGITOL TP-9	2.59 ml./kg.	2.83 ml./kg.	trace Grade 2	severe Grade 8
TERGITOL NPX	2.24 ml./kg.	2.00 ml./kg.	trace Grade 2	moderate Grade 6 (Grade 10 on earlier assay)
Nonionic from C_{11}-C_{15} Secondary Alcohols	2.38 gm./kg. (20% in water)	2.00 ml./kg. (melted) 1.12 gm./kg. (20% in water)	minor Grade 3	severe Grade 9

Confidential

Report 26-136

R: 12-30-63

1-2-64

MELLON INSTITUTE

Special Report

Range Finding Tests on Sodium Sulfate of Triethoxy C_{11} to C_{15} Secondary Alcohols

Chemicals Division, Union Carbide Corporation — Industrial Fellowship 274-26

Summary

Stomach Intubation, rat - LD_{50} = 17.2 ml./kg. or 3.77 gm./kg. on basis of active agent.
Skin Penetration, rabbit - 10 ml./kg. (2.19 gm./kg. on basis of active agent) killed 1 of 4; marked erythema.
Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - moderate, Grade 5.

Sodium sulfate of triethoxy C_{11} to C_{15} secondary alcohols, when administered as formulated, has a low order of acute toxicity by both the peroral and skin penetration routes. The "as formulated" material caused minor irritation on rabbit skin and was moderately injurious to rabbit eyes. Although no inhalation tests were done, no hazard is anticipated by this route under normal handling conditions.

For comparison purposes, a summary of toxicity data obtained with TERGITOL Nonionic TP-9 (Rpt. 22-19; 1959), TERGITOL Nonionic NPX (Rpts. 15-20; 1952 and 16-20; 1953), and Nonionic from C_{11} to C_{15} secondary alcohols (Rpt. 26-135; 1963) is included:

Material	Peroral LD_{50}	Skin Penetration LD_{50}	Uncovered Skin Irritation	Eye Injury
TERGITOL TP-9	2.59 ml./kg.	2.83 ml./kg.	trace Grade 2	severe Grade 8
TERGITOL NPX	2.24 ml./kg	2.00 ml./kg.	trace Grade 2	moderate Grade 6 (Grade 10 on earlier assay)
Nonionic from C_{11}-C_{15} Secondary Alcohols	2.38 gm./kg. (20% in water)	2.00 ml./kg. (melted) 1.12 gm./kg. (20% in water)	minor Grade 3	severe Grade 9
Sodium sulfate of triethoxy C_{11}-C_{15} Secondary Alcohols	17.2 ml./kg. (3.77 gm./kg. on basis of active agent)	10 ml./kg. killed 1 of 4 (2.19 gm./kg. on basis of active agent)	minor Grade 3 (as formulated)	moderate Grade 5 (as formulated)

Confidential

R: 3-24-65

Report 28-36

MELLON INSTITUTE

Special Report

Range Finding Tests on

TERGITOL OP-15 Starter

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 4.29 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 5.66 ml./kg. undiluted; necrosis.

Inhalation, rat -
Substantially saturated vapor evolved under static conditions at approximately 23°C.
8 hours killed 0 of 6

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - moderate, Grade 7.
Intraperitoneal Injection, rat - LD_{50} = 0.71 ml./kg. undiluted.

Interpretation

TERGITOL OP-15 starter manifests moderate acute peroral toxicity but is slightly less toxic by the skin penetration route. No hazard appears to exist by inhalation under normal handling conditions. Rabbit skin suffered minor irritation from uncovered application of the undiluted chemical while rabbit eyes were moderately irritated by the instillation of either very small amounts of the undiluted material or from excess amounts of a 40% or 15% solution in propylene glycol. By intraperitoneal injection to rats, moderate acute toxicity resulted.

TERGITOL OP-15 starter is less toxic and less irritating than either of its components - phenol and ethylene oxide.

Sample

Quantity: 1 pint Date Received: 1-11-65 M. I. Sample No.: 28-4

Submitted by: R. J. Sexton, M.D. Division: Chemicals, South Charleston, Plant Med. Dir., Institute, W. Va. West Virginia

Identification: Reaction product of equal amounts of phenol and ethylene oxide.

Confidential

Report 28-88

R: 6-30-65
4FS
7-2-65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Anionic 15-S-S

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 3.25 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 2.83 ml./kg. undiluted; necrosis.

Uncovered Skin Irritation, rabbit - severe, Grade 6.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.49 gm./kg.; 1% in water.
0.25 ml./kg. undiluted caused deat

Interpretation

TERGITOL Anionic 15-S-S has moderate acute toxicity by both the peroral and skin penetration routes but is highly toxic by intraperitoneal injection to rats. The undiluted chemical caused severe necrosis of the rabbit skin and eyes. In fact, a solution as dilute as 5% in water produced moderate corneal injury. Precautions should be taken to avoid repeated eye and skin contact even with dilute solutions of this chemical as well as direct contact with the undiluted material. No inhalation tests were done but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-91

Submitted by: R. C. Myerly Division: Chemicals, Research and Development
South Charleston, West Virginia

Identification: 22-DS-94-1
a liquid.

Confidential

R: 7-12-65

Report 28-92

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Anionic 15-S-4.6A

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 13.0 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 5.04 ml./kg. undiluted; hemorrhage of the skin.

Intraperitoneal Injection, female rats - LD_{50} =
0.32 ml./kg. undiluted
0.39 gm./kg. as 1% in water

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - severe, Grade 8.

Interpretation

TERGITOL Anionic 15-S-4.6A manifests slight acute peroral toxicity but is moderately toxic by the skin penetration route. The undiluted chemical caused only minor irritation when applied uncovered to rabbit skin. Rabbit eyes were moderately necrosed by instillation of the undiluted material as well as by a 15% aqueous solution, but suffered only minor irritation from a 5% solution. By intraperitoneal injection, both the undiluted TERGITOL and a 1% aqueous solution were highly toxic to rats.

No inhalation tests were done, but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-86

Submitted by: R. C. Myerly Division: Chemicals, Research and Development
South Charleston, West Virginia

Identification: 22-DS-94-1
a yellow liquid

Confidential

Report 28-94

R: 7-15-65

IFS

7-16-65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-7

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 3.25 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 3.18 ml./kg. undiluted; necrosis of the skin.

Intraperitoneal Injection, rat - LD_{50} = 0.18 gm./kg.; 1% aqueous solution, 0.25 ml./kg. undiluted killed 3/5.

Uncovered Skin Irritation, rabbit - moderate, Grade 5.
Eye Injury, rabbit - severe, Grade 8.

Interpretation

TERGITOL Nonionic 15-S-7 is a moderately toxic substance by both the acute peroral and skin penetration routes and is highly toxic when administered intraperitoneally in either the undiluted state or as a 1% aqueous solution. Rabbit skin was moderately irritated by uncovered application of the undiluted chemical while rabbit eyes suffered moderately severe corneal necrosis from instillation of 0.005 ml. amounts. A 15% aqueous solution was just as injurious to rabbit eyes.

No inhalation tests were done but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-88

Submitted by: R. C. Myerly Division: Chemicals, Research and Development
South Charleston, West Virginia

Identification: 22-DS-94-1
a liquid.

Confidential

Report 28-95

R: 7-15-65

7-16-65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-7 Ether Capped

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 7.46 ml./kg. undiluted

Skin Penetration, rabbit - LD_{50} = 2.83 ml./kg. undiluted; hemorrhage of the skin

Intraperitoneal Injection, rat - LD_{50} = 0.088 gm./kg. as a 1% aqueous solution.

Uncovered Skin Irritation, rabbit - minor, Grade 4.

Eye Injury, rabbit - moderate, Grade 5.

Interpretation

TERGITOL Nonionic 15-S-7 ether capped has slight acute peroral toxicity but is moderately toxic by the skin penetration route and highly toxic by intraperitoneal injection. The undiluted chemical was moderately irritating in the rabbit eye but caused only minor irritation when applied uncovered to rabbit skin. No inhalation tests were done but no hazard is anticipated by this route under normal handling conditions.

This ether capped sample of TERGITOL 15-S-7 is about 1/2 as toxic by mouth as plain 15-S-7 (Rpt. 28-94; 1962) and is somewhat less irritating to rabbit skin and eyes.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-87

Submitted by: R. C. Myerly Division: Chemicals, Research and Development South Charleston, West Virginia

Identification: 22-DS-94-1
a yellowish liquid.

Confidential

Report 28-96

R: 7-15-65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-13

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 3.36 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 4.00 ml./kg. undiluted.

Intraperitoneal Injection, rat - LD_{50} - 0.20 gm./kg. as a 1% aqueous solution.

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - severe, Grade 8.

Interpretation

TERGITOL Nonionic 15-S-13 is a moderately toxic substance by both the peroral and skin penetration routes and is highly toxic by intraperitoneal injection. Rabbit eyes suffered moderately severe corneal injury from the instillation of small amounts of the undiluted material and from an excess of a 15% aqueous solution. Rabbit skin was irritated to only a minor degree from uncovered contact with the undiluted chemical.

No inhalation test was done but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-84

Submitted by: R. C. Myerly Division: Chemicals, Research and Development
South Charleston, West Virginia

Identification: 22-DS-94-1
a white solid.

Confidential

Report 28-97

R: 7-15-65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-15

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 6.50 ml./kg. undiluted (melted).

Skin Penetration, rabbit - LD_{50} = 8.00 ml./kg. undiluted (melted); hemorrhage of the skin.

Intraperitoneal Injection, rat - LD_{50} = 0.31 gm./kg. as a 1% aqueous solution
0.25 ml./kg. (melted) killed 5 of 5

Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - minor, Grade 3.

Interpretation

TERGITOL Nonionic 15-S-15 manifests slight acute toxicity by both the peroral and skin penetration routes but is highly toxic by intraperitoneal injection. Rabbit skin and eyes were irritated to only a minor degree by contact with the undiluted chemical.

Inhalation tests were not done but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-85

Submitted by: R. C. Myerly Division: Chemicals, Research and Development
South Charleston, West Virginia

Identification: 22-DS-94-1
a white solid.

Confidential

R: 7-21-65

Report 28-98

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-20

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - LD_{50} = 5.66 gm./kg.; 10% in water.

Skin Penetration, rabbit - LD_{50} = 11.3 gm./kg.; 80% in water.

Uncovered Skin Irritation, rabbit - trace from 80% in water.
Eye Injury, rabbit - trace from 80% in water.
Intraperitoneal Injection, rat - LD_{50} = 0.89 gm./kg. 10% in water.

Interpretation

TERGITOL Nonionic 15-S-20 manifests slight acute toxicity by both the peroral and skin penetration routes and is only moderately toxic by intraperitoneal injection to rats. An 80% aqueous solution of this material is essentially nonirritating to rabbit skin and eyes.

No inhalation tests were done but no hazard is anticipated by this route under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 4-29-65 M. I. Sample No.: 28-89

Submitted by: R. C. Myerly Division: Chemicals, Research and Development, South Charleston, West Virginia

Identification: 22-DS-94-1
white solid.

Confidential

Report 28-99

R: 7-21-65

GAW 7/23/65

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic 15-S-40

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-28

Summary

Stomach Intubation, rat - 16 gm./kg. as 20% in water killed 0 of 5.

Skin Penetration, rabbit - LD_{50} = 16 gm./kg.; 80% in water.

Intraperitoneal Injection, rat - LD_{50} = 1.83 gm./kg.; 10% in water.

Uncovered Skin Irritation, rabbit - trace from 80% in water.

Eye Injury, rabbit - trace from 80% in water.

Interpretation

TERGITOL Nonionic 15-S-40 manifests a low order of acute toxicity by both the peroral and skin penetration routes but is moderately toxic by intraperitoneal injection to rats. An 80% aqueous solution was essentially nonirritating to rabbit skin when applied uncovered while an excess of this same solution caused only traces of irritation in the rabbit eye.

For the purpose of comparison, the following table contains acute toxicity data obtained with the 8 TERGITOLS that were studied recently by this laboratory.

Confidential

Report 29-10

R: 2-8-66

1593

2-15-66

MELLON INSTITUTE

4 Pages

Special Report

Range Finding Tests on TERGITOL Experimental Foamer No. 3

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 22.6 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 7.07 ml./kg. as received.

Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - moderate, Grade 7.

Interpretation

TERGITOL Experimental Foamer No. 3 has a low order of acute peroral toxicity and manifests slight toxicity by the skin penetration route. The "as received" material caused only minor irritation when applied uncovered to rabbit skin but caused moderately severe necrosis in the rabbit eye. A 40% aqueous solution also caused severe eye injury while a 15% solution produced only minor corneal irritation. No hazard is anticipated from infrequent inhalation periods under normal handling conditions.

This foamer is about 1/2 as toxic as TERGITOL Anionic 08 by the peroral route but is more irritating to the rabbit eye. Skin penetration acute toxicity is about the same for both materials.

Sample

Quantity: 1 quart. Date Received: 1-3-66 M. I. Sample No.: 29-2

Submitted by: H. T. Zika Division: Chemicals
Research and Development
South Charleston, W. Va.

Identification: 24-DS-82-5
a pale yellow liquid.

Confidential

Report 29-11

R: 2-9-66
2-15-66

4 Pages

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Experimental Foamer No. 2

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 11.3 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 4.20 ml./kg. as received.

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - moderate, Grade 7.

Interpretation

TERGITOL Experimental Foamer No. 2 manifests slightly acute toxicity by the peroral route and is moderately toxic by skin penetration. The "as received" material caused minor irritation on rabbit skin but caused moderately severe necrosis in the rabbit eye. A 40% aqueous solution also caused severe corneal necrosis while a 15% aqueous solution produced minor corneal irritation. Although no inhalation tests were done, no hazard is anticipated from infrequent inhalation periods under normal handling conditions.

This foamer reflects toxicity of a greater than additive nature by both the peroral and skin penetration routes based upon LD_{50}'s determined previously for both its components: TERGITOL Experimental Foamer No. 3 (Rpt. 29-10; 1966) and TERGITOL Anionic 15-S-3A (Rpt. 26-136; 1963). Despite this fact, it is not a hazardous mixture to handle.

Sample

Quantity: 1 quart. Date Received: 1-3-66 M. I. Sample No.: 29-1

Submitted by: H. T. Zika Division: Chemicals
Research and Development
South Charleston

Identification: 24-DS-82-5
a mixture of TERGITOL Experimental Foamer No. 3 and TERGITOL Anionic 15-S-3A.

Confidential

Report 29-13

R: 2-24-66

2-28-66

5 Pages

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic XD-30

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} - male - 5.66 ml./kg. undiluted.
female - 8.00 ml./kg. undiluted.

Skin Penetration, rabbit - 20 ml./kg. undiluted killed 2 of 4.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Eye Injury, rabbit - trace, Grade 2.

Intraperitoneal Injection, rat - LD_{50} = 0.21 gm./kg. as a 5% aqueous solution.

Interpretation

TERGITOL nonionic XD-30 is slightly toxic when administered perorally to rats and highly toxic by intraperitoneal injection but it manifests a low order of acute toxicity by the skin penetration route on rabbits. The undiluted material caused only minor irritation to rabbit skin and eyes. Although no inhalation tests were done, no hazard is anticipated from infrequent inhalation periods under normal handling conditions.

There appears to be little difference in acute toxicity between TERGITOL XD-30 and previously studied samples of TERGITOL nonionic XD.

Sample

Quantity: 1 pint Date Received: 12-13-65 M. I. Sample No.: 28-355

Submitted by: R. C. Myerly Division: Olefins
Research and Development
South Charleston, W. Va.

Identification: Ref.: 7DHH-38A.
24-DS-68L1
a lower molecular weight
modification of TERGITOL Nonionic XD.

Confidential

Report 29-14

R: 2-25-66
1499
2-2866

6 Pages

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Nonionic XD-60

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 8.57 ml./kg. undiluted.

Skin Penetration, rabbit - 20 ml./kg. undiluted killed 0 of 4.

Uncovered Skin Irritation, rabbit - trace, Grade 2.
Eye Injury, rabbit - trace, Grade 2.
Intraperitoneal Injection, rat - LD_{50} = 0.25 gm./kg., 5% in water.
Subcutaneous Injection, rat - LD_{50} = 0.47 gm./kg., 5% in water.
= 0.77 ml./kg. undiluted.
Intravenous Injection, rat - LD_{50} = 0.37 gm./kg., 5% in saline.

Interpretation

TERGITOL nonionic XD-60 manifests slight acute toxicity by the peroral route, has a very low order of acute toxicity by skin penetration, and caused only traces of irritation on rabbit skin and eyes. Although this material is highly toxic by all 3 parenteral routes tested, it is interesting to note that it is slightly more toxic by the intraperitoneal route than by intravenous injection. No inhalation tests were done but no hazard is anticipated from infrequent inhalation periods under normal handling conditions.

TERGITOL nonionic XD-60 is even less toxic by skin penetration than TERGITOL nonionic XD-30 (Rpt. 29-13; 1966) and is essentially the same in acute toxicity as TERGITOL nonionic XD.

Sample

Quantity: 1 pint Date Received: 12-13-65 M. I. Sample No.: 28-356

Submitted by: R. C. Myerly Division: Olefins
Research and Development
South Charleston, W. Va.

Identification: Ref.: 7DHH-39B;
24-DS-68-1

Confidential

Report 29-63

R: 7-26-66
1478
7-28-66

MELLON INSTITUTE

5 Pages

Special Report

Range Finding Tests on TERGITOL Anionic 15-S-3A, 62.6% Active

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 4.29 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 2.83 ml./kg. as received; some necrosis of the skin.

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.47 ml./kg. as received.

Interpretation

TERGITOL 15-S-3A manifests moderate acute toxicity by both the peroral and skin penetration routes but is somewhat more toxic by intraperitoneal injection. The "as received" material caused minor irritation when applied uncovered to rabbit skin but both the "as received" material and a 15% aqueous solution produced severe eye irritation. Inhalation tests were not done, but no hazard is anticipated from infrequent inhalations under normal handling conditions.

TERGITOL 15-S-3A is about 5 times more toxic perorally than Alfonic 1412 ethoxysulfate (Rpt. 29-62) but is slightly less irritating to rabbit skin in single uncovered application.

The results of repeated skin applications of both these chemicals were given in Rpt. 29-45 titled The Relative Skin Irritation of TERGITOL Anionics versus Alfonic 1412 Alcohol Ethoxysulfate.

Sample

Quantity: 1 pint Date Received: 5-9-66 M. I. Sample No.: 29-128

Submitted by: R. C. Myerly

Division: Chemicals
Research and Development
South Charleston, W. Va.

Identification: 5RXG-106-4;
25-DS-94-5

Confidential

Report 29-64

R: 7-26-66

1498

7-28-66

5 Pages

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Anionic 45-S-3A, 60% Active

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 7.34 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 2.00 ml./kg. as received; some necrosis of the skin.

Uncovered Skin Irritation, rabbit - moderate, Grade 5.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.32 ml./kg. as received.

Interpretation

TERGITOL anionic 45-S-3A, 60% manifests slight acute peroral toxicity but is moderately toxic by skin penetration and highly toxic when injected intraperitoneally. The "as received" material was moderately irritating when applied uncovered to rabbit skin but caused more severe injury in covered skin applications and when instilled into the rabbit eye. No inhalation tests were done but no hazard is anticipated from infrequent inhalation under normal handling conditions.

TERGITOL 45-S-3A is more toxic by the peroral, skin penetration and intraperitonea routes than a previously studied sample of Alfonic 1412 ethoxysulfate (Rpt. 29-62; 1966

The result of 3-day repeated skin applications of both these materials were given in Rpt. 29-45 titled "The Relative Skin Irritation of TERGITOL Anionics versus Alfonic 1412 Alcohol Ethoxysulfate."

Sample

Quantity: 1 pint Date Received: 5-9-66 M. I. Sample No.: 29-127

Submitted by: R. C. Myerly

Division: Chemicals
Research and Development
South Charleston, W. Va.

Identification: 5-RXG-106-1
25-DS-94-4
a liquid.

Confidential

Report 29-65

R: 7-27-66

11-8

7-28-66

MELLON INSTITUTE

5 Pages

Special Report

Range Finding Tests on TERGITOL Anionic 45-S-3TEA (HP), 60.16% Active

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 7.46 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 1.59 ml./kg. as received.

Uncovered Skin Irritation, rabbit - moderate, Grade 5.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.54 ml./kg. as received.

Interpretation

TERGITOL Anionic 45-S-3TEA (HP) is a slightly toxic chemical by peroral administration and moderately toxic by both the skin penetration and intraperitoneal routes. The "as received" material caused moderate irritation when applied uncovered to rabbit skin but both the "as received" material and a 15% aqueous solution produced severe eye injury. Inhalation tests were not done but no hazard is anticipated from infrequent inhalations under normal handling conditions.

TERGITOL 45-S-3TEA (HP) is more toxic by both the peroral and skin penetration routes than a previously studied sample of Alfonic 1412 ethoxysulfate (Rpt. 29-62; 1966).

The results of 3-day repeated skin applications of both these materials were given in Rpt. 29-45 titled "The Relative Skin Irritation of TERGITOL Anionics versus Alfonic 1412 Alcohol Ethoxysulfate."

Sample

Quantity: 1 pint Date Received: 5-9-66 M. I. Sample No.: 29-129

Submitted by: R. C. Myerly Division: Chemicals
Research and Development
South Charleston, W. Va.

Identification: 5-RXG-106-2;
25-DS-94-4
a liquid.

Confidential

Report 29-66

R: 7-28-66
KFS
7-29-66

6 Pages

MELLON INSTITUTE

Special Report

Range Finding Tests on TERGITOL Anionic 45-S-3TEA (C), 60% Active and Comparison with Other Secondary Alcohol Surfactants

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 6.17 ml./kg. as received.

Skin Penetration, rabbit - LD_{50} = 2.52 ml./kg. as received; spotty edema and hemorrhage of the skin.

Uncovered Skin Irritation, rabbit - severe, Grade 6.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.42 ml./kg. as received.

Interpretation

TERGITOL Anionic 45-S-3TEA (C), 60% active manifests slight acute peroral toxicity, is moderately toxic by the skin penetration route and highly toxic by intraperitoneal injection. Rabbit skin and eyes suffered severe irritation from contact with this chemical. Although no inhalation tests were done, no hazard is anticipated from infrequent inhalations under normal handling conditions.

For comparison, the following table summarizes acute toxicity results obtained with several other related surfactants studied at this time plus Alfonic 1412 ethoxysulfate which was supplied by the Colgate-Palmolive Company:

Confidential

Report 29-124

R: 1-5-67

1-9-67

4 pages

MELLON INSTITUTE

Special Report

TERGITOL Min-Foam

Range Finding Toxicity Studies

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-29

Summary

Stomach Intubation, rat - LD_{50} = 3.08 ml./kg. undiluted

Skin Penetration, rabbit - LD_{50} = 1.78 ml./kg. undiluted

Uncovered Skin Irritation, rabbit - minor

Eye Injury, rabbit - severe

Intraperitoneal Injection, rat - LD_{50} = 0.77 ml./kg. undiluted

Interpretation

TERGITOL Min-Foam manifests moderate acute toxicity by the peroral, skin penetration, and intraperitoneal routes. By skin penetration, the toxicity was not increased by abrading the skin before application. The undiluted chemical was only mildly irritating to rabbit skin but, as is the case with most TERGITOLS, it caused severe necrosis in the rabbit eye in the undiluted form and must be considered an eye irritant under the Federal Hazardous Substances Labelling Act (FHSLA).

If TERGITOL Min-Foam is to be sold for use in the home in the state in which it was studied by this laboratory, then it must be labelled as "Toxic and Irritating."

Sample

Quantity: 1 pint Date Received: 10-4-66 M. I. Sample No.: 29-250

Submitted by: R. C. Myerly Division: Chemicals Research and Development South Charleston, W. Va.

Identification: 7 DHH-64; 26-DS-98-2

Confidential

Report 30-7

R: 1-20-67
IFS
1-27-67

5 Pages

MELLON INSTITUTE

Special Report

TERGITOL Nonionic 15-S-12

Range Finding Toxicity Studies

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-30

Summary

Stomach Intubation, rat - LD_{50} = 2.83 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 4.00 ml./kg. undiluted.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Repeated Skin Applications, rabbit - moderate after 9 applications (3 times a day for 3 days).

Eye Injury, rabbit - severe, Grade 8.

Intraperitoneal Injection, rat - 0.77 ml./kg. undiluted.

Interpretation

TERGITOL nonionic 15-S-12 manifests moderate acute toxicity by the peroral, skin penetration and intraperitoneal routes. Although no inhalation tests were done, no hazard is anticipated from infrequent inhalations under normal handling conditions. The undiluted chemical caused only minor irritation when applied uncovered to rabbit skin but was moderately irritating when applied three times a day for 3 consecutive days. As is characteristic of TERGITOLS in general, rabbit eyes suffered moderately severe corneal necrosis from instillation of very small amounts undiluted as well as from aqueous solutions of 15% concentration.

Sample

Quantity: 5 gallons Date Received: 5-23-66 M. I. Sample No. 29-138

Submitted by: R. C. Myerly Division: Chemicals Research and Development South Charleston, W. Va.

Identification: IS. No. 374256 (5RXG-121)
25-DS-110-1
a secondary alcohol surfactant

Confidential

Report 30-18

R: 2-24-67

IFF8

3-13-67

5 Pages

MELLON INSTITUTE

Special Report

TERGITOL Anionic 15-S-3S

Range Finding Toxicity Studies

Chemicals Division, Union Carbide Corporation Industrial Fellowship 274-30

Sample

Quantity: 8 ounces Date Received: 11-17-66 M. I. Sample No.: 29-275

Submitted by: P. R. Kinkel Division: Chemicals
Research and Development
Tarrytown, New York

Identification: Anal. No. TS-8323

Summary

Stomach Intubation, rat - LD_{50} = 5.66 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 1.26 ml./kg. undiluted; necrosis of the skin.

Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - severe, Grade 9.
Intraperitoneal Injection, rat - LD_{50} = 0.54 ml./kg. undiluted.

Interpretation

TERGITOL Anionic 15-S-3S manifests slight acute peroral toxicity but is moderately toxic by both the skin penetration and intraperitoneal routes. The undiluted chemical caused only minor irritation when applied uncovered to rabbit skin. As is typical of most of the TERGITOLS studied by this laboratory, rabbit eyes were burned by not only the undiluted material but by an aqueous solution as dilute as 5% as well. Although no inhalation tests were done, no hazard is anticipated from infrequent inhalations under normal handling conditions.

Confidential

Chemical Hygiene Fellowship

Report 30-41

Re: 4-26-67
IHF
4-27-67
22 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

TERGITOL 15-S-3

Results of Three-Month Feeding to Rats and Dogs

Union Carbide Corporation, Chemicals and Plastics Operations Division

Table of Contents

Summary

TERGITOL Nonionic 15-S-3 was incorporated in the diet of Harlan-Wistar albino rats during a three-month interval, to produce nominal dosage levels of 2.0, 1.0, 0.5, 0.25 and 0.00 gm./kg. Beagle dogs received 3.333, 1.667, 0.8333 or 0.00% of the 15-S-3 in their diets which produced intakes of 0.96, 0.69 and 0.32 gm./kg. No effects were found in mortality or in gross or micropathology in either species. Blood urea nitrogen, alkaline phosphatase and bromsulfalein retention, done only on dogs, were also unaffected. Statistically significant effects were associated with the following criteria:

Dosage Level, gm./kg.	Species	Appetite	Body Weight Gain	Liver Wt. as % of Body Wt.	Hemoglobin, (dogs only)
2.0	rat	c, a	c, c	c, c	
1.0	rat	a, -	-, b	c, c	
0.96	dog	c[1]	c[1]	c[1]	a
0.5	rat	-, -	-, -	c, b	
0.69	dog	-	a[2]	-	-
0.25	rat	-, -	-, -	-, b	
0.32	dog	-	-	-	-

First letter for rats = significance for males; second for females
a. $0.05 > P > 0.01$ b. $0.01 > P > 0.001$ c. $P < 0.001$
Data for males and females combined for dogs.
1. Feeding of 15-S-3 discontinued at this dosage level after 7 weeks.
2. Significant for first 5 weeks.

Since no micropathological effect on livers was found even at 2 gm./kg./day in the rat or 0.96 gm./kg./day in the dog, the liver weight increase in rats fed at 0.25 gm./kg./day does not constitute an adverse effect. The "no adverse effect" level is 0.25 gm./kg./day in the rat and 0.32 gm./kg./day in the dog.

Sample

Five gallons of TERGITOL Nonionic 15-S-3 were received 7-12-66 from Texas City, Texas. The label bore analysis number TS-11499. We were informed that the molecular weight was 331, that the sample contained 0.13% water, had 45 PT-CO color and a pH of 7.7.

Three-Month Feeding to Rats

Animal Management, Procedure and Statistical Treatment of Data

Harlan-Wistar rats from our breeding colony, originally established and currently maintained with rats purchased from Harlan Industries, Cumberland,

Confidential

Chemical Hygiene Fellowship

Report 30-54

R: 6-6-67
IHF 6
6-4-67
22 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

TERGITOL 15-S-3A

Results of Feeding in the Diet of Rats and Dogs for Three Months

Union Carbide Corporation, Chemicals and Plastics Operations Division

Summary

TERGITOL Anionic 15-S-3A Sulfate was incorporated in the diet of Harlan-Wistar albino rats, during a three-month interval, to produce nominal dosage levels of 4.0, 2.0, 1.0, 0.5 and 0.0 gm./kg. Beagle dogs received 3.333, 1.667 or 0.00% of the 15-S-3A in their diets, which produced intakes of 1.1, 0.62 and 0.00 gm./kg. No effects were found in mortality or in gross or micropathology in either species. Blood urea nitrogen, alkaline phosphatase, bromsulfalein retention and hematology, done only on dogs, were also unaffected. Statistically significant effects were associated with the following criteria:

Dosage Level, Gm./Kg.	Species	Body Weight Gain	Diet Consumption	Liver Weight as % of Body Wt.	Kidney Weight as % of Body Wt.
4.0	rat	c, b		c, c	c, a
2.0	rat			c, c	
1.0	rat			c, c	
1.1	dog	b[1.]	*		

First letter for rats = significance for males; second for females.
a. $0.05 > P > 0.01$ b. $0.01 > P > 0.001$ c. $P < 0.001$
Data for males and females combined for dogs. * = Depressed
1. Feeding of 15-S-3A discontinued at this level after 7 weeks.

Neither dogs nor rats were adversely affected at 0.62 or 0.5 gm./kg., respectively. The no "ill-effect" dosage level for dogs and rats for three months in the diet, therefore, lies between these levels and 1.0 gm./kg.

Sample

Five gallons of TERGITOL Anionic 15-S-3A Sulfate were received 7-12-66 from Texas City, Texas. The polyethylene container was labelled: Passed TS 9615, Works Lab, Texas City. Analysis for this sample was: 60.5% actives, 21.7% water, 3.9% free oil, 27 KLETT color on 10% dilution, 7.3 pH, 1.4% chlorides and 13.2% ethanol.

Confidential

Chemical Hygiene Fellowship

Report 30-59

R: 6-14-67
6-16-67
24 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

TERGITOL 15-S-7

Results of Feeding in the Diet of Rats and Dogs for Three Months

Union Carbide Corporation, Chemicals and Plastics Operations Division

Summary

TERGITOL Nonionic 15-S-7 was incorporated in the diet of Harlan-Wistar albino rats, during a three-month period, to produce nominal dosage levels of 0.5, 0.25, 0.125, 0.0625 or 0.000 gm./kg. Beagle dogs received 0.8333, 0.4167, 0.2083 or 0.00% of the 15-S-7 in their diets which produced intakes of 0.28, 0.16, 0.08 or 0.00 gm./kg. No effects were found in mortality or in gross or micropathology in either species. Blood urea nitrogen, alkaline phosphatase, bromsulfalein retention and hematology, done only on dogs, were also unaffected. Statistically significant effects were associated with the following criteria:

Dosage Level, Gm./Kg.	Species	Body Weight Gain	Appetite	Liver Weight as % of Body Wt.
0.5	rat	c, c	-, a	-, a
0.25	rat	a, c	-, a	
0.28	dog	b[1].	*	
0.125	rat	a, a		

First letter for rats = significance for males; second for females.
a. $0.05 > P > 0.01$ b. $0.01 > P > 0.001$ c. $P < 0.001$
Data for males and females combined for dogs. * = Depressed
1. Feeding of 15-S-7 discontinued at this dosage level after 7 weeks.

The "no adverse effect" level is, therefore, between 0.0625 and 0.125 gm./kg. for the rats and between 0.16 and 0.28 gm./kg. for the dogs.

Sample

Five gallons of TERGITOL Nonionic 15-S-7 were received 6-3-66 from South Charleston, West Virginia. The can was labelled: flashpoint 440°F.

Confidential

Chemical Hygiene Fellowship

Report 30-60

R: 6-16-67

HPS

6-20-67

24 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

TERGITOL 15-S-9

Results of Feeding in the Diet of Rats and Dogs for Three Months

Union Carbide Corporation, Chemicals and Plastics Operations Division

Summary

TERGITOL Nonionic 15-S-9 was incorporated in the diet of Harlan-Wistar rats, during a three-month interval, to produce nominal dosage levels of 0.5, 0.25, 0.125, 0.0625 or 0.000 gm./kg. Beagle dogs received 0.8333, 0.4167, 0.2083 or 0.00% of the 15-S-9 in their diets which produced intakes of 0.35, 0.15, 0.08 or 0.00 gm./kg. No effects were found in mortality, in liver or kidney weights as percentages of body weight or in micropathology in either species. Blood urea nitrogen, alkaline phosphatase and bromsulfalein retention, done only on dogs, were also unaffected. Statistically significant effects were associated with the following criteria:

Dosage Level, Gm./Kg.	Species	Body Weight Gain	Appetite	Hemoglobin (dogs only)
0.5	rat	c, c	-, c	
0.35	dog	b[1]		a
0.25	rat	b, b	-, a	
0.125	rat	a, -		

First letter for the rats = significance for males; second for females.
a. $0.05 > P > 0.01$ b. $0.01 > P > 0.001$ c. $P < 0.001$
Data for males and females combined for the dogs.
1. Feeding of 15-S-9 discontinued at this dosage level after 7 weeks.

Therefore, the no "ill-effect" level is between 0.0625 and 0.125 gm./kg. for the rats and between 0.15 and 0.35 gm./kg. for the dogs.

Sample

Five gallons of TERGITOL Nonionic 15-S-9 were received 6-3-66 from South Charleston, West Virginia. The can was labelled: flash point 470 F, DO-9768.

Confidential
Special Report 30-79
4 Pages

R: 7-21-67
HS
7-26-67

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Anionic 15-S-3TEA

Range Finding Toxicity Studies

Editor: J. S. Nycum
Contributor: N. I. Condra
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - LD_{50} = 8.57 ml./kg. undiluted.
Skin Penetration, rabbit - LD_{50} = 4.49 ml./kg. undiluted.
Uncovered Skin Irritation, rabbit - minor, Grade 4.
Eye Injury, rabbit - severe, Grade 8.
Intraperitoneal Injection, rat - LD_{50} = 0.48 ml./kg. undiluted.

Interpretation

TERGITOL Anionic 15-S-3TEA manifests slight acute peroral toxicity but can be considered moderately toxic by both the skin penetration and intraperitoneal routes. The undiluted material caused only minor irritation when applied uncovered to rabbit skin while rabbit eyes suffered severe corneal injury from instillation of 0.005 ml. amounts undiluted and from an excess of a 15% aqueous solution. No inhalation tests were done but no hazard is anticipated from infrequent inhalation under normal handling conditions.

The results of a 3-day repeated skin application of this TERGITOL were given in Report 29-45; 1966, titled "The Relative Skin Irritation of TERGITOL Anionics versus Alfonic 1412 Alcohol Ethoxysulfate."

Sample

Quantity: 8 ounces Date Received: 5-27-66 M. I. Sample No.: 29-139

Submitted by: F. R. Kinkel Division: Research and Development, Tarrytown, N. Y.

Identification: liquid.

Confidential

Chemical Hygiene Fellowship

Report 30-102

R: 9-27-67
Weil 10/5/67

26 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

Results of Testing TERGITOL TP-9 for Tumorigenicity as well as for its Potential Tumor-Promoter Action

Author: C. S. Weil
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Groups of approximately 35 mice were tested by daily (5 days per week) skin painting of TERGITOL TP-9 and several other concurrently tested materials. No papillomas or carcinomas resulted with TP-9 in this life-span test.

Furthermore, when paintings were made after the skins of the mice were prepared for tumor promotion by initiator-treatment with 75 γ of DMBA (dimethyl benzanthracene), TERGITOL TP-9 produced an incidence of papillomas and carcinomas similar to that of the negative-control groups; i.e., those that received only DMBA or that received DMBA initially followed by daily paintings of acetone.

Samples Used

(1) 7,12-dimethylbenz[a]anthracene (DMBA) purchased from D.P.I., Eastman Kodak Company Organic Chemicals Department.

(2) Croton oil, oleum tigli. The oil was manufactured by Fritzsche Brothers, Inc., New York, N. Y. and was purchased from H. Hohmann Pharmacy, East Pittsburgh, Pa.

(3) Acetone. Spectroanalyzed acetone, four one-gallon bottles, were obtained from Fisher Scientific Company. They were from lot 720755.

(4) Dodecane. A 1.5 kg. sample, labelled 99%, olefin-free, 384103, was received 9-29-59 from Matheson, Coleman and Bell, Norwood, Ohio.

(5) TERGITOL TP-9. Five gallons were received 1-13-61 from South Charleston, West Virginia. Data by Rader, reference IS-002581, dated 8-4-61, may be found in file 40D11. TERGITOL TP-9 is coded as material "a" in Table 30-189, group designation M and N.

CHW 12/6/67
R: 11-2-67

Confidential

Chemical Hygiene Fellowship

Report 30-127

36 Pages

MELLON INSTITUTE

Industrial Fellowship 274-30

Special Report

Results of Testing TERGITOL Nonionic XD for Tumorigenicity as well as for its Potential Tumor-Promoter Action

Author: C. S. Weil
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Groups of approximately 35 to 40 mice were tested by 5 day per week skin painting of TERGITOL XD concurrently with several other materials. Absolutely no papillomas or carcinomas resulted from painting a 70% acetone solution of TERGITOL XD in this life-span test.

However, when paintings were made after the skins of the mice were prepared for tumor promotion by initiator treatment with dimethyl benzanthracene (DMBA), an increased incidence of carcinomas occurred when two initiator doses of DMBA preceded paintings with 70% TERGITOL XD, and in another study an increased incidence of papillomas (and perhaps carcinomas) resulted when only one initiator dose preceded TERGITOL XD painting. Paintings with 5% TERGITOL XD after DMBA initiation were substantially negative.

It should be emphasized, however, that XD is neither a tumorigen nor a carcinogen. It acts, as do several other materials such as phenol and Span 20, as a tumor promoter, when applied in a solution many times as concentrated as would be contacted by humans in any probable application. Furthermore, to the extent that promoting action can be quantitated, TERGITOL XD is a less active promoter than croton oil or dodecane.

Samples Used

(1) 7,12-dimethylbenz[a]anthracene (DMBA) purchased from D.P.I., Eastman Kodak Company Organic Chemicals Department. It was purified in March of 1964 as follows:

A column was packed with about 120 grams of silica gel in a slurry of cyclohexane which was distilled just before use. The column was charged with one gram of DMBA in about 250 ml. of cyclohexane. Solvents were put through in the following order: 300 ml. cyclohexane, 75 ml. of 2% benzene in cyclohexane, 300 ml. of 7% benzene in cyclohexane and 2600 ml. of 10% benzene in cyclohexane. After approximately 400 ml. of the 10% benzene solution had been put through, 100 ml. fractions were collected. The first two fractions were combined, as were the third

Confidential
Special Report 31-29
10 Pages

R: 2-19-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

Miscellaneous Agricultural Chemicals and Formulation Ingredients

Acute Toxicity Data, Chemicals and Plastics Division

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

This report contains miscellaneous acute toxicity data accumulated on five agricultural chemicals and ten ingredients used in Agricultural Chemical Formulations. Individual reports were not issued because of the limited amount of data collected. Previous reporting has been via letters to the interested parties.

* * * * *

Bisphenol S, 50WP (Peroral, Intraperitoneal, Inhalation)

Compound 21149 2G (Four-Hour Sweat Test)

Compound 21149 10G Formulations (Four-Hour Sweat Test)

Compound 28332, 50WP (Peroral, Intraperitoneal, Inhalation)

SEVIN, 20G (Four-Hour Sweat Test)

* * * * *

Ingredients Used in Agricultural Chemical Formulations

N,N-Diethyltoluamide (Peroral)
N,N-Dimethylformamide (Intraperitoneal)
EMCOL H-902 (Peroral, Intraperitoneal)
GAF Emulphor EL-719 (Peroral, Intraperitoneal)
N-Methyl Pyrollidone (Peroral)
Pyrax ABB Clay (Inhalation)
Sperlox (Peroral)
Superphosphate, Granulated 20% (Peroral)
TERGITOL Nonionic NP-14 (Peroral, Intraperitoneal, Sutcutaneous)
UC Special Surfactant Mix (Peroral)

GCW 3/29/68

Confidential
Special Report 31-41
8 Pages

R: 3-18-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

Miscellaneous Acute Toxicity Data, Chemicals and Plastics Division

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

This report contains miscellaneous acute toxicity data accumulated on 5 materials. Individual reports were not issued because of the limited amount of data collected. Previous reporting has been via letters to the interested parties.

Following the main part of this report is miscellaneous acute toxicity data accumulated on previously reported compounds.

* * * * *

Bis(2-Isocyanatoethyl)fumarate (Inhalation)

Nulok 321 (Inhalation, Irritation Tests)

1,3,6-Octatriene (Intraperitoneal)

Pentacyclo[8.2.1.1.0.0]tetradecyl-5,11 (or 12)-bis(2-hydroxyethyl sulfide) (Intraperitoneal)

UCAR Latex TCX-8650 (Stripped) (Inhalation)

* * * * *

Bis(2-Isocyanatoethyl)fumarate
FDI-X

Sample

Quantity: 350 grams Date Received: 4-7-67 M. I. Sample No.: 30-86

Submitted by: J. F. Lacount Division: Chemicals and Plastics South Charleston, W. Va.

Identification: 28-DS-30-1 Powder Charge No.: 6845

HAW 5/20/68

Confidential
Special Report 31-56
6 Pages

R: 5-1-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Min-Foam 1X

Range Finding Toxicity Studies

(Incorporating Data Pertinent to Federal Hazardous Substance Act-FHSA)

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - LD_{50} = 3.25 ml./kg. undiluted.
5.0 ml./kg. undiluted killed 3 of 5.
Skin Penetration, rabbit - 2.0 ml./kg. undiluted on abraded skin killed 2 of 5.
2.0 ml./kg. undiluted on intact skin killed 2 of 5.
Covered Skin Irritation, rabbit - not an irritant by FHSA definition.
Eye Injury, rabbit - an irritant by FHSA definition.
Intraperitoneal injection, rat - LD_{50} = 0.18 ml./kg. undiluted.

Interpretation

TERGITOL Min-Foam 1X is moderately toxic by both the peroral and skin penetration routes and is quite toxic by intraperitoneal injection. Although the undiluted material caused marked erythema when applied covered to intact and abraded rabbit skin, it is not classified as a skin irritant under the Federal Hazardous Substance Act. An excess amount of the undiluted material causes dullness of the cornea and iritis when instilled in rabbit eyes and is therefore considered an eye irritant under FHSA definition.

FHSA Data, Obtained by the Methods of the FDA Regulations of August 12, 1961, (26FR7333).

191.1 (f) Toxic Substances

(1) Administration perorally at 5.0 ml./kg. caused 3 deaths among a group of 5 rats. Toxic by ingestion under the regulations definition.

(2) Inhalation tests not performed.

(3) Continuous covered contact for 24 hours at a dosage level of 2.0 ml./kg. killed 2 of 5 rabbits with abraded skin and 2 of 5 rabbits with intact skin. Not toxic by skin penetration under the regulations definition.

Confidential
Special Report 31-57
6 Pages

R: 5-1-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Min-Foam 2X

Range Finding Toxicity Studies

(Incorporating Data Pertinent to Federal Hazardous Substance Act-FHSA)

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - 5.0 ml./kg. undiluted killed 3 of 5.
Skin Penetration, rabbit - 2.0 ml./kg. undiluted on abraded skin killed 1 of 5.

Covered Skin Irritation, rabbit - not an irritant according to FHSA definition.
Eye Injury, rabbit - not an irritant according to FHSA definition.
Intraperitoneal Injection, rat - LD_{50} = 0.54 ml./kg. undiluted.

Interpretation

TERGITOL Min-Foam 2X can be considered to be no more than moderately toxic by both the peroral and skin penetration routes and is toxic by intraperitoneal injection. Although the undiluted material causes erythema when applied covered to rabbit skin it is not classified as a skin irritant under the Federal Hazardous Substance Act. An excess amount of the undiluted material caused no corneal injury when instilled in rabbit eyes, and is not classified as an eye irritant under the Federal Hazardous Substance Act.

TERGITOL Min-Foam 1X (Report 31-56; 1968) was also recently studied by this laboratory. According to FHSA regulations and definition it is of the same order of acute toxicity as TERGITOL Min-Foam 2X except that TERGITOL Min-Foam 1X is classified as an eye irritant.

FHSA Data, Obtained by the Methods of the FDA Regulations of August 12, 1961, (26FR7333).

191.1 (f) Toxic Substances
(1) Administration perorally at 5.0 ml./kg. caused 3 deaths among a group of 5 rats. Toxic by ingestion under the regulations definition.

(2) Inhalation tests not performed.

GAW 5/20/68

R: 5-1-68

Confidential
Special Report 31-58
6 Pages

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL SPEEDWET

Range Finding Toxicity Studies

(Incorporating Data Pertinent to Federal Hazardous Substance Act-FHSA)

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - 5.0 ml./kg. undiluted killed 4 of 5.
Skin Penetration, rabbit - 2.0 ml./kg. undiluted on abraded skin killed 0 of 5.

Covered Skin Irritation, rabbit - an irritant by FHSA definition.
Eye Injury, rabbit - an irritant by FHSA definition.
Intraperitoneal Injection, rat - LD_{50} = 0.18 ml./kg. undiluted.

Interpretation

TERGITOL SPEEDWET can be considered to be no more than moderately toxic by both the peroral and skin penetration routes, and is quite toxic by intraperitoneal injection. The undiluted material causes marked erythema and necrosis when applied under cover to abraded and intact rabbit skin. When instilled in rabbit eyes it causes dullness of the cornea and iritis, and is classified as a skin and eye irritant under Federal Hazardous Substance Act regulations.

TERGITOL Min-Foam 1X (Report 31-56; 1968) and TERGITOL Min-Foam 2X (Report 31-57; 1968) were also recently studied by this laboratory. According to FHSA regulations and definitions all are of the same order of acute toxicity. However, TERGITOL SPEEDWET is both a skin and eye irritant while TERGITOL Min-Foam 1X is only an eye irritant.

FHSA Data, Obtained by the Methods of the FDA Regulations of August 12, 1961, (26FR7333).

191.1 (f) Toxic Substances
(1) Administration perorally at 5.0 ml./kg. caused 4 deaths among a group of 5 rats. Toxic by ingestion under the regulations definition.

(2) Inhalation tests not performed.

Confidential
Special Report 31-111
4 Pages

CSW 9/11/68
R: 9-9-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL 15-S-15

Results of Feeding in the Diets of Rats for 7 Days

Author: C. S. Weil Contributors: M. D. Woodside, Jack R. Bernard

For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

TERGITOL 15-S-15 was incorporated in the diets of Harlan-Wistar albino rats and fed for 7 days at dosage levels of 5.0, 1.0, 0.25, 0.05 or 0.00 grams per kilogram per day. Criteria of effect examined included mortality, appetite, growth and weights of the livers and kidneys.

Body weight gain was considerably depressed at 5.0 and 1.0 grams per kilogram. At the highest dosage level mean liver weight, per se and as percentage of body weight, was lower but while mean kidney weight per se was depressed, this as percentage of body weight was significantly higher than that of the controls. No significant differences were associated with 0.25 or 0.05 grams per kilogram per day.

Using the relationships between one-week and ninety-day rat feeding studies established in our report 31-35, issued 2-29-68, the following predictions can be made for sub-acute oral feeding of longer duration:

Basis	Predicted 90-Day Minimum Effect Level	Predicted 90-Day Maximum No-Effect Level
Median	1.0/3.0 = 0.33 gm./kg.	0.25/3.0 = 0.08 gm./kg.

Sample

Two 8-ounce jars of TERGITOL 15-S-15 were received 8-20-68 from South Charleston, West Virginia. They bore the passed designation RDA 2071 and received the Mellon Institute sample number 31-273 a and b.

Confidential
Special Report 31-112
4 Pages

GLW 9/11/68
R: 9-9-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL 15-S-20

Results of Feeding in the Diets of Rats for 7 Days

Author: C. S. Weil Contributors: M. D. Woodside, J. R. Bernard

For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

TERGITOL 15-S-20 was incorporated in the diets of Harlan-Wistar albino rats and fed for 7 days at dosage levels of 5.0, 1.0, 0.25, 0.05 or 0.00 grams per kilogram per day. Criteria of effect examined included mortality, appetite, growth and weights of the livers and kidneys.

Body weight gain and liver and kidney weight per se were considerably depressed at 5.0 grams per kilogram. Weight gain only of the males at 1.0 gram per kilogram was also lower than that of their controls. No significant differences were associated with 0.25 or 0.05 grams per kilogram per day.

Using the relationships between one-week and ninety-day rat feeding studies established in our report 31-35, issued 2-29-68, the following predictions can be made for sub-acute oral feeding of longer duration:

Basis	Predicted 90-Day Minimum Effect Level	Predicted 90-Day Maximum No-Effect Level
Median	1.0/3.0 = 0.33 gm./kg.	0.25/3.0 = 0.08 gm./kg.

Sample

Two 8-ounce jars of TERGITOL 15-S-20 were received 8-20-68 from South Charleston, West Virginia. They bore the passed designation RDA 2083 and received the Mellon Institute sample number 31-274 a and b.

Confidential
Special Report 31-118
4 Pages

GWW 9/16/68

R: 9-13-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Nonionic TMN-10

Results of Feeding in the Diets of Rats for 7 Days

Author: C. S. Weil Contributors: M. D. Woodside, J. R. Bernard

For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

TERGITOL Nonionic TMN-10 was incorporated in the diets of Harlan-Wistar albino rats and fed for 7 days at dosage levels of 5.0, 1.0, 0.25, 0.05 or 0.00 grams per kilogram per day. Criteria of effect examined included mortality, appetite, growth and weights of the livers and kidneys.

Appetite, body weight gain and the weights of the liver and kidneys of the rats at 5.0 gm./kg./day were significantly depressed. By the end of the 7 days of doses no significant differences were associated with 1.0 gm./kg. or lower dosage levels.

Using the relationships between one-week and ninety-day rat feeding studies established in our Report 31-35, issued 2-29-68, the following predictions can be made for sub-acute oral feeding of longer duration:

	Predicted 90-Day	
Basis	Minimum Effect Level	Maximum No-Effect Level
Median	5.0/3.0 = 1.67	1.0/3.0 = 0.33

Sample

A 32-ounce bottle of TERGITOL Nonionic TMN-10 was received 8-30-68 from South Charleston, West Virginia. It bore the following identification:

Reg. No. 511-01-6498
DS # 183
Passed IS-485670
Mellon Institute sample number 31-285

Gleed 10/8/68

Confidential
Special Report 31-123
5 Pages

R: 10-3-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Nonionic 15-S-3

Range Finding Toxicity Studies

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - LD_{50} = 32.00 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 5.66 ml./kg. undiluted.

Inhalation, rat -
Substantially saturated vapor generated at 26.3°C.
8 hours killed 0 of 6
Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - trace, Grade 2.
Intraperitoneal Injection, rat - LD_{50} = 2.38 ml./kg. undiluted.

Interpretation

TERGITOL Nonionic 15-S-3 has a low degree of acute peroral toxicity, is slightly toxic by skin penetration, and is well tolerated by intraperitoneal injection. The undiluted material causes minor irritation when applied uncovered to the rabbit skin and trace corneal injury when an excess is instilled in rabbit eyes. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 6-14-68 M. I. Sample No.: 31-152

Submitted by W. B. Lanham Division: Chemicals and Plastics
South Charleston, W. Va.

Identification: Ref.: DS-87
Reg. No.: 511-01-4876 Charge No.: 03578
Liquid.

Glaeu 1-10-68

Confidential
Special Report 31-161
5 Pages

R: 12-4-68

MELLON INSTITUTE
Chemical Hygiene Fellowship

TERGITOL Nonionic 15-S-5

Range Finding Toxicity Studies

Editor: J. S. Nycum Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - LD_{50} = 8.57 ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 4.00 ml./kg. undiluted.

Inhalation, rat -
Substantially saturated vapor generated at 23.5°C.
8 hours killed 0 of 6

Uncovered Skin Irritation, rabbit - minor, Grade 3.
Eye Injury, rabbit - moderate, Grade 5.
Intraperitoneal Injection, rat - LD_{50} = 0.81 ml./kg. undiluted.

Interpretation

TERGITOL Nonionic 15-S-5 has slight acute peroral toxicity, is moderately toxic by skin penetration and toxic by intraperitoneal injection. The undiluted material causes minor irritation when applied uncovered to rabbit skin. Moderate corneal injury results when 0.02 ml. is instilled in rabbit eyes while 0.005 ml. causes minor corneal injury. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 32 ounces Date Received: 9-18-68 M. I. Sample No.: 31-337

Submitted by: W. B. Lanham Division: Chemicals and Plastics
South Charleston, W. Va.

Identification: DS No. 189
Reg. No. 511-01-6846
Liquid.

Charge No.: 3578

Confidential
Special Report 32-93
5 Pages

Chemical Hygiene Fellowship
MELLON INSTITUTE
Carnegie-Mellon University

TERGITOL Fulling Agent 225

Range Finding Toxicity Studies

Editor: C. S. Weil
Contributors: N. I. Condra, E. R. Kinkead
For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Summary

Stomach Intubation, rat - LD_{50} = 2.83 (2.09 to 3.82) ml./kg. undiluted.

Skin Penetration, rabbit - LD_{50} = 5.66 (3.46 to 9.24) ml./kg. undiluted.

Inhalation, rat -
Substantially saturated vapor
8 hours at 8.1 mg./L. killed 0 of 6

Uncovered Skin Irritation, rabbit - trace, Grade 2.

Eye Injury, rabbit - moderate, Grade 5.

Interpretation

TERGITOL Fulling Agent 225 was moderately toxic by the peroral and slightly toxic by the skin penetration routes. Minor irritation resulted when the undiluted material was applied uncovered to the rabbit skin. Small quantities, 0.02 or 0.005 ml. undiluted, produced moderate to severe corneal injury in rabbit eyes. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor generated at room temperature under normal handling conditions.

Sample

Quantity: 32 ounces
Date Received: 7-3-69
M. I. Sample No.: 32-185

Submitted by: H. T. Zika
Division: Chemicals and Plastics
South Charleston, W. Va.

Identification: Reg. No. 511-01-4879

Confidential
Special Report 35-67

R: 9-25-72

Chemical Hygiene Fellowship

MELLON INSTITUTE

Carnegie-Mellon University

Miscellaneous Toxicity Studies

Editor: C. S. Weil

For: UNION CARBIDE CORPORATION, Chemicals and Plastics Operations Division

Results of Department of Transportation Corrosive Test

(4-Hour Covered Skin Exposure)

Title 49 - Transportation

Chapter 1 - Hazardous Materials Regulations Board

Department of Transportation

To amend §173.240 to provide a quantitative definition for corrosive materials by utilization of a 4-hr exposure time, using the rabbit test as described in 21 CFR §191.11

PRODUCT	M. I. SAMPLE NUMBER	RESULTS AND CONCLUSION
n-Butyl acrylate	35-378	1 of 6 rabbits with necrosis; NOT a corrosive material
Butyric acid	35-414	2 of 2 rabbits with necrosis; a corrosive material
Epichlorhydrin	35-415	2 of 4 rabbits with necrosis; a corrosive material
2-Ethylbutyric acid	35-416	2 of 2 rabbits with necrosis; a corrosive material
2-Ethylhexoic acid	35-417	2 of 4 rabbits with necrosis; a corrosive material

(Continued)

TERGITOL Solid Surfactant S-55

M. I. Sample No. 35-422 Initiator: E. L. Musgrave

Date Started 8-15-72

Peroral, Single Dose to Rats

LD50 - 3.73 (2.52 to 5.52) gm/kg; 1 ml = 0.5 gm in water.

Conditions - male Harlan-Wistar rats, 206 to 300 gm.

Dosage; gm/kg	Dead / Dosed	Days to Death	Weight Change	Signs and/or Symptoms
8.0	5/5	0,1,1,1,1	-	Sluggish, pilo-erection, slight gasping, salivation 15 min, death of 1 within 4 hrs of dose.
4.0	3/5	1,1,7	15,25	Sluggish, pilo-erection and salivation 5 to 15 min after dose.
2.0	0/5	-	16 to 55	Sluggish, pilo-erection, rapid breathing 10 min after dose.

Gross Pathology - petechial hemorrhage of lungs; livers mottled and burned where in apposition to stomach; kidneys speckled; stomachs and intestines distended, gas and liquid filled; urinary bladders full in victims.

Conclusions - moderately toxic following acute peroral intubation.
"Toxic" by FHSA definition.

TERGITOL Solid Surfactant S-55
Sample 35-422
Peroral, Single Dose to Rats
LD50 = 3.73 (2.52 to 5.52) gm/kg; 1 ml = 0.5 gm in water.

UC 48831
5,5-Dimethyl-3-ethyl-2-[O-(methylcarbamoyl)oximino]-4-thiazolidone
Sample 35-450
Peroral, Single Dose to Rats
LD50 = 67.3 (37.9 to 119.4) mg/kg; 1 ml = 10 mg in corn oil.

UC 48836
S-Methyl-N-(O,S-dimethylthiolphosphoryl)thioacetimidate
Sample 35-380
Peroral, Single Dose to Rats
LD50 = 0.00616 (0.00447 to 0.00848) ml/kg; 1 ml = 0.01 ml in corn oil.
A D.O.T. Class B poison perorally.

Protocol Sheets and Standard Test Procedures are available for each entry upon request.

Carrol S. Weil, M.A.
Senior Fellow

Approved:

Charles P. Carpenter, Ph.D.
Administrative Fellow

Typed: October 17, 1972 - md

Special Report 36-9
Confidential

February 21, 1973
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Division of Sponsored Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

Miscellaneous Toxicity Studies

Editor: C. S. Weil

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operations Division

Results of Department of Transportation Corrosive Test

(4-Hour Covered Skin Exposure)

Title 49 - Transportation

Chapter 1 - Hazardous Materials Regulations Board

Department of Transportation

To amend §173.240 to provide a quantitative definition for corrosive materials by utilization of a 4-hr exposure time, using the rabbit test as described in 21 CFR §191.11

PRODUCT	CHF SAMPLE NUMBER	RESULTS AND CONCLUSION
UCANE Alkylate 11	36-2	0 of 6 rabbits with necrosis; NOT a corrosive material
UCANE Alkylate 12	36-3	0 of 6 rabbits with necrosis; NOT a corrosive material
UCANE Alkylate 13	36-4	0 of 6 rabbits with necrosis; NOT a corrosive material
UCANE Alkylate LR	36-5	0 of 6 rabbits with necrosis; NOT a corrosive material
TERGITOL 15-S-7	36-1	0 of 6 rabbits with necrosis; NOT a corrosive material

Special Report 36-12
5 Pages
Confidential

March 2, 1973
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Division of Sponsored Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Anionic 45-S-S

Range Finding Toxicity Studies

Editor: C. S. Weil Contributors: N. I. Condra, D. L. Geary, Jr., L. D. Calisti

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operation Division

Summary

Stomach Intubation, rat - LD50 = 5.66 ml/kg, undiluted.

Skin Penetration, rabbit - LD50 = 1.59 ml/kg, undiluted.

Inhalation, rat -
Substantially saturated vapor
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - moderate, Grade 5.

Eye Injury, rabbit - severe, Grade 8.

Interpretation

TERGITOL anionic 45-S-S was slightly toxic following acute peroral and moderately toxic following acute covered skin application. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor generated at room temperature under normal handling conditions. Application of the undiluted material to uncovered rabbit skin and of the undiluted material or aqueous solution (5 or 15%) to the eyes of rabbits resulted in moderate skin and severe eye irritation.

Sample

Quantity: 1 quart Date Received: 1-12-73 CHF Sample No.: 36-7

Submitted by: R. C. Myerly Division: Chemicals and Plastics
South Charleston, W. Va.

Identification: 6964; 1-9-73

Special Report 37-10
Confidential

March 29, 1974
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Division of Sponsored Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operation Division

UC 21865
2-Methylsulfonyl-2-methylpropionaldehyde N-methylcarbamoyloxime
Sample 36-366
Peroral, Single Dose to Rats
LD50 = 21.4 (14.5 to 31.7) mg/kg; 1 ml = 10 mg in corn oil
A D.O.T. Class B poison perorally

UC 36920
Proadifen hydrochloride
Sample 36-367
Peroral, Single Dose to Rats
LD50 = 2140 (1450 to 3170) mg/kg; 1 ml = 100 mg in corn oil

UC 46207
2-[O-(Methylcarbamoyl)oximino]-1,4-dithiane
Sample 36-314
Intraperitoneal, Single Dose to Rats
LD50 = 7.02 (3.27 to 15.1) mg/kg

UC 46207 plus UC 27898
2-[O-(Methylcarbamoyl)oximino]-1,4-dithiane plus N-Methyl-5-norbornene-2,3-dicarboximide
Samples 36-314 plus 36-313
Peroral, Joint Action, Single Dose to Rats
Equiconcentration Mixture:
Predicted LD50 (P) = 129 mg/kg
Observed LD50 (O) = 197 (143 to 271) mg/kg; 1 ml = 110 mg of mixture in corn oil
1 ml of mixture = 10 mg of UC 46207 plus 100 mg of UC 27898
Ratio: P/O = 0.655; Adjusted Ratio = -0.527
Equitoxic Mixture:
Predicted LD50 (P) = 361 mg/kg
Observed LD50 (O) = 453 (335 to 611) mg/kg; 1 ml = 100 mg of mixture in corn oil, 1 ml of mixture = 2 mg of UC 46207 plus 98 mg of UC 27898
Ratio: P/O = 0.797; Adjusted Ratio = -0.255

UC 47108
2-[O-Methylcarbamoyl)oximino]-1,4-dithiane-4-oxide
Sample 36-315
Intraperitoneal, Single Dose to Rats
LD50 = 4.82 (3.57 to 6.51) mg/kg; 1 ml = 10 mg in corn oil

CLASSIFICATION OF CORROSIVE HAZARDS

Title 49 - Transportation
Chapter 1 - Hazardous Materials Regulations Board
Department of Transportation

Amended §1500.41 to provide a quantitative definition for corrosive materials by utilization of a 4-hr exposure time and nonabraded skin, in the rabbit test as otherwise described in Title 16, Chapter 11, §1500.41, Consumer Product Safety Commission.

PRODUCT	CHF SAMPLE NO.	RESULTS AND CONCLUSION
Diene 205 (di-2-cyclopentenyl ether)	37-4	0 of 6 with necrosis; therefore, not a corrosive material
6-methyl-1,2,5,6-tetra-hydro benzyl alcohol	37-5	2 of 6 with necrosis; therefore, a corrosive material
Vinylcyclohexene monoxide	37-6	1 of 6 with necrosis; therefore, not a corrosive material
PM 3659	37-12	2 of 2 with necrosis; therefore, a corrosive material
PM 5316	37-13	2 of 6 with necrosis; therefore, a corrosive material
TERGITOL nonionic 13-S-5	37-15	1 of 6 with necrosis; therefore, not a corrosive material
TERGITOL nonionic 45-S-3	37-16	2 of 6 with necrosis; therefore, a corrosive material
TERGITOL nonionic 45-S-10	37-17	1 of 6 with necrosis; therefore, not a corrosive material
TERGITOL nonionic 45-S-12	37-18	0 of 6 with necrosis; therefore, not a corrosive material
TERGITOL nonionic TMN-3	37-19	0 of 6 with necrosis; therefore, not a corrosive material
Polyamine H special	37-24	2 of 2 with necrosis; therefore, a corrosive material

Confidential
Special Report 37-32
5 Pages

April 24, 1974
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Division of Sponsored Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic 45-S-10

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operation Division

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Summary

Stomach Intubation, rat - LD50 - 2.14 ml/kg, undiluted

Skin Penetration, rabbit - LD50 - 3.18 ml/kg, undiluted

Inhalation, rat -
Substantially saturated vapor
8 hours killed 0 of 6

Uncovered Skin Irritation, rabbit - minor, Grade 3

Eye Injury, rabbit - severe, Grade 9

Interpretation

TERGITOL nonionic 45-S-10 was moderately toxic following acute peroral intubation and covered dermal application. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor generated at room temperature under normal handling conditions. While minor capillary injection resulted upon application of this undiluted TERGITOL to uncovered rabbit skin, severe injury of the cornea and iris resulted from 0.005 ml undiluted and also from a 5% dilution in water.

Sample

Quantity: 1 quart

Date Received: 2-8-74

CHF Sample No.: 37-60

Submitted by: Dr. D. J. Foster

Division: Research and Development
South Charleston, W. Va.

Identification: 1S-718085
511-01-0567

Charge No.: 04030

Confidential
Special Report 37-34
5 Pages

April 25, 1974
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Division of Sponsored Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic 45-S-3

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operation Division

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Summary

Stomach Intubation, rat - LD50 - 16.2 ml/kg; as received

Skin Penetration, rabbit - LD50 - 8.0 ml/kg; as received

Inhalation, rat -
Substantially saturated vapor; *ca* 0.1 mg/liter
8 hours killed 0 of 6

Uncovered Skin Irritation, rabbit - minor, Grade 4

Covered Skin Irritation, 4-Hour D.O.T. Test, rabbit - 0 of 6 with necrosis, with CHF sample no. 37-133 and 37-59
2 of 6 with necrosis with CHF sample no. 37-16

Eye Injury, rabbit - none, Grade 1

Interpretation

TERGITOL 45-S-3 was slightly toxic following acute, covered dermal application and had an extremely low order of acute toxicity following either peroral administration or inhalation of substantially saturated vapor generated at room temperature. Only minor irritation resulted from uncovered skin application; the most recent sample produced no necrosis on covered rabbit skin, therefore, 45-S-3 is not a "corrosive," by D.O.T. definition. No eye injury resulted from application of an excess, 0.5 ml per eye.

Sample

Quantity: 1 quart Date Received: 2-8-74; 3-25-74; 1-17-74 CHF Sample No.: 37-59; 37-133; 37-16

Submitted by: Dr. D. J. Foster Division: Research and Development, South Charleston, W. Va.

Identification:	37-59	37-133	37-16
	4-EXS-56	511-01-126I	511-01-0199
	511-01-0567	D-69722	

Charge No.: 04030

Special Report 37-71
Confidential

August 16, 1974
Tel: (412) 327-1020

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Carnegie-Mellon Institute of Research
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4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: Union Carbide Corporation, Chemicals and Plastics Operation Division

Niobium Oxylate

Sample 37-35
Micropathology of Tissues of Acute Peroral Intubation Rats

UNION CARBIDE A-1120-C, A-1125 and A-1126

A-1120-C---$(NH_2)(CH_2)_2NH(CH_2)_3Si(OCH_3)_3$ + 3 to 5% ethylene diamine
A-1125-----$CH_3OOC(CH_2)_2NHCH_2NH(CH_2)_3Si(OCH_3)_3$ + 30% methanol
A-1126-----A-1120 - 22 to 26%, UCON 50HB660 - 14 to 18%, methanol 61-64%

Skin Penetration, Single Dose to Rabbits
A-1120-C - LD50 = 16.0 (4.48 to 57.2) ml/kg, as received
A-1125 - 16 ml/kg, as received, killed 0 of 5
A-1126 - 16 ml/kg, as received, killed 0 of 5

Uncovered Skin Irritation, Rabbit
A-1120-C - minor, Grade 3
A-1125 - minor, Grade 3
A-1126 - minor, Grade 3

Covered Skin Irritation, Rabbit, 4-Hour D.O.T. Test
A-1120-C - 0 of 6 rabbits with necrosis; not a corrosive

UC 49035, UC 49111, UC 49695, UC 50674, UC 51162, CAPTAN

Comparative Primary Skin Irritation, Rabbits
Four uncovered skin irritation tests, each with 4 to 7 materials or formulations, were performed. The UC 49035 samples and formulations were slightly, but consistently, more irritating than the vehicles and controls employed; dimethyl phthalate, acetophenone and CAPTAN. The majority of the irritation noted was capillary injection; a few rabbits had erythema but no edema or necrosis was seen 24 hours after the uncovered application of 0.01 ml per material or formulation.

UC 39157

2,2-Dimethyl-3-thietanone O-methylcarbamoyloxime
Sample 37-167
Peroral, Single Dose to Rats
LD50 = 2.10 (1.38 to 3.21) mg/kg; 1 ml = 1 mg in corn oil
A D.O.T. Class B poison perorally

CLASSIFICATION OF CORROSIVE HAZARDS

Title 49 - Transportation
Chapter 1 - Hazardous Materials Regulations Board
Department of Transportation

Amended §1500.41 to provide a quantitative definition for corrosive materials by utilization of a 4-hr exposure time and nonabraded skin, in the rabbit test as otherwise described in Title 16, Chapter 11, §1500.41, Consumer Product Safety Commission.

PRODUCT	CHF SAMPLE NO.	RESULTS AND CONCLUSION
Lime Sample Generator Slurry	37-218	0 of 6 with necrosis; therefore, NOT a corrosive material
Lime Sample 35% Solution	37-217	0 of 6 with necrosis; therefore, NOT a corrosive material
TERGITOL 08	37-268	0 of 6 with necrosis; therefore, NOT a corrosive material
TERGITOL 7	37-321	3 of 6 with necrosis; therefore, a corrosive material
Silane A-1100	37-340	2 of 2 with necrosis; therefore, a corrosive material
Silane A-1102	37-339	1 of 6 with necrosis; therefore, NOT a corrosive material
Amines SD (SPOT)	37-441	0 of 6 with necrosis; therefore, NOT a corrosive material
Xylene	-	0 of 6 with necrosis; therefore, NOT a corrosive material

Carrol S. Weil, M.A.
Senior Fellow

Approved:

Charles P. Carpenter, Ph.D.
Administrative Fellow

Date: August 29, 1974

Typed: *md*

Special Report 38-8
3 Pages
Confidential

January 16, 1975
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL 15-S-Propionate

Range Finding Toxicity Studies

(Tested and interpreted as prescribed in Regulations under the Federal Hazardous Substances Act (FHSA), Title 16, Chapter II - Consumer Product Safety Commission, Part 1500, Federal Register 38, No. 187, September 27, 1973, p 27012 and following pages.)

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics Operations Division

* * * * *

Summary

Stomach Intubation, rat - LD50 = 57.0 ml/kg; as received.

Skin Penetration, rabbit - LD50 > 16.0 ml/kg; as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 20°C.
8 hours killed 0 of 6.

Covered Skin Irritation, rabbit - primary irritation score = 0.0.

Eye Injury, rabbit - negative.

Interpretation

TERGITOL 15-S-propionate was not "toxic" (by FHSA definition) following acute peroral intubation or covered dermal application. By FHSA definition, this material is not irritating to the skin or eyes. Substantially saturated vapor, evolved under static conditions at room temperature, did not kill rats in a single 8 hour exposure.

Sample

Quantity: 1 quart

Date Received: 11-12-74

CHF Sample No.: 37-610

Submitted by: R. R. Fields

Division: Research and Development
South Charleston, W. Va.

Identification: 511-01-6054
11RRF-82

Charge No.: 09542

Special Report 38-119
3 Pages
Confidential

September 23, 1975
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
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4400 Fifth Avenue
Pittsburgh, PA 15213

3-Day Repeated Skin Irritation Tests on Selected Cationics

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics Operations Division

* * * * * * * * *

Summary

Nine applications of the selected cationics (received as 10% dilutions) to rabbit skin resulted in the following responses, ranked from the greatest to the least.

Sample	Mean Reaction	Mean Score
Cationic 15-S Alcohol	moderate to marked edema	5.6
Cationic LB-250	moderate edema	5.0
Cationic LB-385 + 15% EO	moderate edema	4.8
Cationic Silicone 1973-68	marked capillary injection	2.0
Cationic Silicone 1973-63	no reaction	0.0

Samples

The following samples were furnished by J. A. Faucher of Tarrytown, NY on 7-8-75 for repeated skin irritation testing:

Sample (dilution as received)	Identification	CHF Sample Number
Cationic Silicone 1973-68 (10% in water)	-	38-348
Cationic Silicone 1973-63 (10% in water)	-	38-349
Cationic 15-S Alcohol (10% in ethanol)	11-RRF-20	38-350
Cationic LB-250 (10% in ethanol)	11-RRF-17	38-351
Cationic LB-385 + 15% EO (10% in water)	11-RRF-117	38-352

Special Report 38-125
Confidential

August 18, 1975
Tel: (412) 327-1020

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4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics Operations Division

* * * * *

Summary

CARBOWAX 35,000
Sample 38-73
Uncovered Skin Irritation, Rabbit; 50% in distilled water
No irritation on 5 rabbits

CARBOWAX TPEG-990
Sample 38-72
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 3 rabbits, moderate capillary injection on 2. Grade 2.

Cationic CARBOWAX 200
Sample 38-74
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 4 rabbits, moderate capillary injection on one. Grade 2.

Cationic Silicone 1973-63
Sample 38-77
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 4 rabbits, moderate capillary injection on one. Grade 2.

Cationic Silicone 1973-64
Sample 38-78
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 4 rabbits, moderate capillary injection on one. Grade 2.

Cationic Silicone 1973-67
Sample 38-79
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 3 rabbits, moderate capillary injection on 2. Grade 2.

Cationic Silicone 1973-68
Sample 38-80
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 2 rabbits, moderate capillary injection on 2, marked capillary injection on one. Grade 2.

Cationic Silicone 1973-69
Sample 38-81
Uncovered Skin Irritation, Rabbit; Undiluted
No irritation on 2 rabbits, moderate capillary injection on 3. Grade 2.

Cationic Tergitol 15-S-9
Sample 38-75
Uncovered Skin Irritation, Rabbit; Undiluted
Marked capillary injection on one rabbit, moderate erythema on one, marked edema on 3. Grade 5.

Polysulfone SR (Batch 10157-136)
Sample 38-170
Single Inhalation, Rats
Substantially saturated vapor, static conditions at 21°C
8 hours killed 0 of 6

UC 49035; 2 lb/gal Emulsifiable Concentrate (in Xylene)
5-Methyl-4-[[O-(N-methyl-N-trichloromethylthio)carbamoyl]oximino]-1,3-oxathiolane
Sample 38-160
Peroral, Single Dose to Rats
LD50 = 0.177 (0.070 to 0.445) ml/kg; as received
Eye Injury, Rabbit; Undiluted
Moderate corneal injury, with iritis, from 0.02 ml undiluted per eye; minor corneal injury, with iritis on one, from 0.005 ml per eye. Grade 5.

UC 51725
N,N'-bis-[[5-Methyl-4-[O-(N-methylcarbamoyl)oximino]oxathiolane]]sulfide
Sample 38-186
Peroral, Single Dose to Rats
LD50 = 15.9 (9.72 to 25.9) mg/kg; 1 ml = 10 mg in corn oil
A D.O.T. Class B poison perorally

UC 52852
N,N'-bis-[1-Isopropylthioacetaldehyde-O-(N-methylcarbamoyl)oxime]sulfide
Sample 38-82
Peroral, Single Dose to Rats
LD50 = 35.6 (16.8 to 75.7) mg/kg; 1 ml = 10 mg in corn oil
A D.O.T. Class B poison perorally

UC 52853
N,N'-bis-[[2-[O-(N-Methylcarbamoyl)oximino]-1,4-dithiane]]sulfide
Sample 38-83
Peroral, Single Dose to Rats
LD50 > 640.0 mg/kg; 1 ml = 10 mg in corn oil

UC 52882
N-[1-Methylthioacetaldehyde-O-(N-methylcarbamoyl)oxime] N'-[3-isopropyl-4-methyl-carbonylaminophenyl-N'-methylcarbamate]sulfide
Sample 38-103
Peroral, Single Dose to Rats
LD50 = 28.3 (15.6 to 51.3) mg/kg; 1 ml = 10 mg in corn oil
A D.O.T. Class B poison perorally

Special Report 39-40
Confidential

March 1, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
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Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics Operation Division

* * * * *

Summary

Glutaraldehyde (25% in water)

Sample 38-389
Peroral, Single Dose to Rats
LD50 = 1.54 (1.14 to 2.08) ml/kg; dosed as received

Sherlock Type GC Concentrate

Sample 38-468
Eye Injury, rabbit

0.02 ml undiluted per eye:	moderate to severe corneal injury with iritis - 24 to 48 hours moderate corneal injury, iritis on 2 - 72 hours no corneal injury - 7 days
0.005 ml undiluted per eye:	moderate corneal injury and iritis, one of 5 eyes - 24 to 48 hours no corneal injury - 72 hours Grade 5
0.5 ml per eye of 4 oz/5 gal dilution:	no corneal injury to 5 eyes - 24 to 72 hours

Silicone LE-45

Sample 38-422
Eye Injury, rabbit
Capillary injection on the sclera at 24 hr, but no corneal injury on 5 eyes from an excess, 0.5 ml undiluted per eye. Grade 1.
Eye Injury, rabbit - repeated doses
Moderate congestion of conjunctivae, but no corneal injury on 6 eyes from doses of 0.1 ml undiluted per eye given once a day for 5 days.

TERGITOL 15-S-9 Concentrate

Sample 38-467
Eye Injury, rabbit

0.005 ml undiluted per eye:	severe corneal injury, with iritis - 24 hours moderate corneal injury - 24 hours through 4 days vascularization partially covering cornea; pterygium present - 7 days

TERGITOL 15-S-9 Concentrate (Continued)

Eye Injury, rabbit

0.5 ml per eye of 4 oz/gal dilution: no corneal injury to minor injury, with iritis - 24 to 48 hours
no corneal injury to trace injury - 72 hours to 4 days
no corneal injury - 7 days

UC 45650

S-Methyl O-(N-methylcarbamoyl)acetothiohydroximate

Sample 38-459

Peroral, Single Dose to Rats

LD50 = 47.6 (31.1 to 72.7) mg/kg; 1 ml = 10 mg in PEG 400

A D.O.T. Class B poison perorally

UC 46207

2-[O-(Methylcarbamoyl)oximino]-1,4-dithiane

Sample 38-460

Peroral, Single Dose to Rats

LD50 = 8.41 (5.50 to 12.8) mg/kg; 1 ml = 10 mg in PEG 400

A D.O.T. Class B poison perorally

UC 51693

S-Methyl-N-[[N'-[N"-(1-methylthioethylideneiminooxycarbonyl)-N"-methylaminothiosulfenyl]-N'-methylcarbamoyloxy]]-thioacetimidate

Sample 38-407

Peroral, Single Dose to Rats

LD50 = 190 (125 to 291) mg/kg; 1 ml = 10 mg in corn oil

UC 53322

1-[[N-Methyl-N-[N'-(1-methylthioethylideneaminoxycarbonyl)-N'-methylaminosulfenyl]carbamoyloxy]]-3,4,5-trimethylbenzene

Sample 38-343

Peroral, Single Dose to Rats

LD50 = 95.1 (62.3 to 145) mg/kg; 1 ml = 10 mg in corn oil.

UC 53351

5-Methyl-N-[N'-methyl-N"-(methyl)phenylaminosulfenyl carbamoyloxy]-thioacetimidate

Sample 38-359

Peroral, Single Dose to Rats

LD50 = 269 (176 to 411) mg/kg; 1 ml = 10 mg in corn oil heated to 35°C

UC 53356

1-[[N-Methyl-N-[N'-(1-methylthioethylideneaminoxycarbamoyl)-N'-methylaminosulfenyl]carbamoyloxy]]naphthalene

Sample 38-360

Peroral, Single Dose to Rats

LD50 = 160 (98.1 to 261) mg/kg; 1 ml = 10 mg in corn oil

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July 14, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL 1214-9

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics

* * * * *

Summary

Stomach Intubation, rat - LD50 = 3.08 ml/kg; dosed as received.

Skin Penetration, rabbit, - LD50 = 5.04 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 26°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Eye Injury, rabbit - severe, Grade 8.

...pretation

TERGITOL 1214-9 was moderately toxic following acute peroral intubation ...slightly toxic following acute covered dermal application. Administration of the ...luted material to rabbit skin resulted in minor irritation. Instillation of the ...luted and diluted material in rabbit eyes resulted in severe corneal injury, ...iritis. No hazard is anticipated from the infrequent inhalation of substantially ...rated vapor evolved at room temperature under normal handling conditions.

...le

...tity: 1 quart Date Received: 5-24-76 CHF Sample No.: 39-240

...tted By: R. R. Fields Division: Chemicals & Plastics
South Charleston, WV

...ification: 9-EXS-37
511-01-2565 Charge No.: 03578

Special Report 39-95
5 Pages
Confidential

July 14, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
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4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL 1214-12

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 3.56 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 25°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Eye Injury, rabbit - severe, Grade 9.

Interpretation

TERGITOL 1214-12 was moderately toxic following acute peroral intubation and covered dermal application. Administration of the undiluted material to rabbit skin resulted in minor irritation. Instillation of the undiluted and diluted sample in rabbit eyes resulted in severe corneal injury, with iritis. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 quart Date Received: 5-24-76 CHF Sample No.: 39-241

Submitted By: R. R. Fields Division: Chemicals and Plastics
South Charleston, WV

Identification: 9-EXS-38
511-01-2565 Charge No.: 03578

Special Report 39-97
4 Pages
Confidential

July 22, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
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TERGITOL 1214-5

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics

* * * * *

Summary

Stomach Intubation, rat - LD50 = 4.29 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 5.66 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 22°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Eye Injury, rabbit - severe, Grade 8.

Interpretation

TERGITOL 1214-5 was moderately toxic following acute peroral intubation and slightly toxic following acute covered dermal application. Administration of the undiluted material to rabbit skin resulted in minor irritation. Instillation of the undiluted and diluted sample in rabbit eyes resulted in moderate to severe corneal injury, with iritis. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 quart
Date Received: 5-24-76
CHF Sample No.: 39-239

Submitted By: R. R. Fields
Division: Chemicals & Plastics
South Charleston, WV

Identification: 9-EXS-40
511-01-2565

Charge No.: 03578

Special Report 39-98
4 Pages
Confidential

July 22, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
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TERGITOL 1214-7

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics

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Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 2.52 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 26°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - trace, Grade 2.

Eye Injury, rabbit - moderate, Grade 7.

Interpretation

TERGITOL 1214-7 was moderately toxic following acute peroral intubation and covered dermal application. Administration of the undiluted material to rabbit skin resulted in trace irritation. Instillation of the undiluted and diluted sample resulted in moderate to severe corneal injury, with iritis. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 quart
Date Received: 5-24-76
CHF Sample No.: 39-238

Submitted By: R. R. Fields
Division: Chemicals and Plastics
South Charleston, WV

Identification: 9-EXS-41
511-01-2565
Charge No.: 03578

Special Report 39-104
5 Pages
Confidential

August 5, 1976
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL 1214-3

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation,* Chemicals and Plastics

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Summary

Stomach Intubation, rat - LD50 = 5.66 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 4.00 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 24°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - minor, Grade 3.

Eye Injury, rabbit - moderate, Grade 6.

Interpretation

TERGITOL 1214-3 was slightly toxic following acute peroral intubation and moderately toxic following acute covered dermal application. Administration of the undiluted material to rabbit skin resulted in minor irritation. Instillation of the undiluted and diluted sample in rabbit eyes resulted in moderate to severe corneal injury, with iritis. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 quart Date Received: 5-24-76 CHF Sample No.: 39-237

Submitted By: R. R. Fields Division: Chemicals and Plastics
South Charleston, WV

Identification: 9-EXS-39
511-01-2565 Charge No.: 03578

Project Report 40-17
4 Pages
February 8, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-3

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics

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Summary

Stomach Intubation, rat - LD50 = 16.0 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 7.13 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Trace, Grade 1.

Interpretation

TERGITOL Nonionic Surfactant 25-L-3 had an extremely low order of toxicity following single stomach intubation and was slightly toxic following single covered dermal application. Administration of the undiluted material resulted in minor irritation to rabbit skin and trace corneal injury in rabbit eyes.

Sample

Quantity: 1 quart

Date Received: 11-17-76

CHF Sample No.: 39-464

Submitted By: R. R. Fields

Division: Chemicals and Plastics
South Charleston, WV

Identification: 511-01-6612

Charge No.: 03578

Project Report 40-19
4 Pages
February 23, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-9

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 3.36 ml/kg; dosed as received (melted).

Skin Penetration, rabbit - LD50 = 3.56 ml/kg; dosed as received (melted).

Uncovered Skin Irritation, rabbit - Minor, Grade 3 (sample melted).

Eye Injury, rabbit - Moderate, Grade 5 (sample melted).

Interpretation

TERGITOL Nonionic Surfactant 25-L-9 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in minor irritation to rabbit skin and moderate corneal injury, with iritis on 2, in rabbit eyes.

Sample

Quantity: 1 quart

Date Received: 11-17-76

CHF Sample No.: 39-467

Submitted By: R. R. Fields

Division: Chemicals and Plastics
South Charleston, WV

Identification: 511-01-6612

Charge No.: 03578

Project Report 40-20
5 Pages
February 23, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-5

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 4.00 ml/kg; dosed as received (melted).

Skin Penetration, rabbit - LD50 = 1.00 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Moderate, Grade 5.

Interpretation

TERGITOL Nonionic Surfactant 25-L-5 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in minor irritation to rabbit skin and moderate corneal injury, with iritis, in rabbit eyes.

Sample

Quantity: 1 quart Date Received: 11-17-77 CHF Sample No.: 39-465

Submitted By: R. R. Fields Division: Chemicals and Plastics
South Charleston, WV

Identification: 511-01-6612 Charge No.: 03578

Project Report 40-21
4 Pages
February 28, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-12

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 3.25 ml/kg; dosed as received (sample melted).

Skin Penetration, rabbit - LD50 = 5.04 ml/kg; dosed as received (melted).

Uncovered Skin Irritation, rabbit - Trace, Grade 2 (sample melted).

Eye Injury, rabbit - Severe, Grade 8 (sample melted).

Interpretation

TERGITOL Nonionic Surfactant 25-L-12 was moderately toxic following single stomach intubation and slightly toxic following single covered dermal application. Administration of the undiluted material resulted in trace irritation to rabbit skin. Instillation of the material undiluted or diluted in distilled water resulted in severe corneal injury, with iritis in one or two rabbit eyes.

Sample

Quantity: 1 quart Date Received: 11-17-76 CHF Sample No.: 39-468

Submitted By: R. R. Fields Division: Chemicals and Plastics South Charleston, WV

Identification: 511-01-6612 Charge No.: 03578

Project Report 40-23
4 Pages
March 2, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-7

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received (sample melted).

Skin Penetration, rabbit - LD50 = 1.26 ml/kg; dosed as received (melted).

Uncovered Skin Irritation, rabbit - Minor, Grade 3 (melted).

Eye Injury, rabbit - Severe, Grade 8 (melted).

Interpretation

TERGITOL Nonionic Surfactant 25-L-7 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application to rabbit skin resulted in minor irritation; instillation in rabbit eyes resulted in severe corneal injury, with iritis.

Sample

Quantity: 1 quart Date Received: 11-17-76 CHF Sample No.: 39-466

Submitted By: R. R. Fields Division: Chemicals and Plastics South Charleston, WV

Identification: 511-01-6612 Charge No.: 03578

CONFIDENTIAL: Not to be released outside UCC without the written consent of the C&P Medical Director, Occupational Health Team Operations Manager or Product Safety Director.

Project Report 40-94
4 Pages
August 3, 1977
Tel: (412) 327-1020

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CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic TX-115

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 2.46 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 2.24 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 25°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Nonionic TX-115 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in trace skin irritation to one of 5 rabbits. Severe corneal injury, with iritis, resulted in rabbit eyes from instillation of small quantities of the undiluted material and from dilution in distilled water. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions. Many TERGITOLs have been studied previously. As in the present study, delayed death, with lung damage, from skin contact and severe eye irritation were frequently observed.

Sample

Quantity: 1 quart Date Received: 3-11-77 CHF Sample No.: 40-117

Submitted By: H. T. Zika Division: Chemicals and Plastics
South Charleston, WV

Identification: 50/50 11-PAM-37/11-PAM-56
Reg. No. 511-01-1237 Charge No.: 05985

Project Report 40-97
4 Pages
August 8, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Surfactant LN-60

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 2.24 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 27°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - None, Grade 1.

Eye Injury, rabbit - Severe, Grade 9.

Interpretation

TERGITOL Surfactant LN-60 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in no irritation to rabbit skin. Severe corneal injury, with iritis, resulted from instillation into rabbit eyes of small undiluted quantities or 0.5 ml of a dilution in water. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions. Many TERGITOLs have been tested previously. As in the present study, delayed death, with lung damage, from skin contact and eye irritation were frequently observed.

Sample

Quantity: 1 quart Date Received: 3-31-77 CHF Sample No.: 40-134

Submitted By: R. R. Fields Division: Chemicals and Plastics
South Charleston, WV

Identification: 11-PAM-100
Reg. no. 511-01-1741 Charge No.: 03578

Project Report 40-140
7 Pages
November 2, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL 25-L-3 Sulfate

Range Finding Toxicity Studies

(Tested and interpreted as prescribed in Regulations under the Federal Hazardous Substances Act (FHSA), Title 16, Chapter II - Consumer Product Safety Commission, Part 1500, Federal Register 38, No. 187, September 27, 1973, p 27012 and following pages.)

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 5.66 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 3.17 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 26°C.
8 hours killed 0 of 6.

Covered Skin Irritation, rabbit -
Primary irritation score = 4.25; not a skin "irritant."

Eye Injury, rabbit - 6 of 6 eyes "positive;" an eye "irritant."

Interpretation

TERGITOL 25-L-3 Sulfate was not "toxic" by FHSA definition, following single stomach intubation or covered dermal application routes of administration. It was not an FHSA "irritant" to the skin but was an eye "irritant." Substantially saturated vapor evolved at room temperature under static conditions did not kill rats in an 8-hr exposure; therefore, this material is not considered "toxic" by FHSA definition.

Sample

Quantity: 1 quart
Date Received: 7-25-77
CHF Sample No.: 40-260
Submitted By: D. C. Galante
Division: Chemicals and Plastics
Tarrytown, NY
Charge No.: 09147

Project Report 40-141
November 11, 1977
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics Operations Division

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Summary

Aerosol OT
Sample 40-207
Repeated Application to Rabbit Skin (9 Doses, 0.01 ml each, in 3 Days)
Mean score = 6.6 (moderate necrosis)

Bisphenol A
Sample 40-248
Repeated Application to Rabbit Skin
Mean score = 0.0 (moderate capillary injection after 3 doses; nothing after 9 doses).

2,6-Dinitro-p-cresol (Sample 3141)
Sample 40-289
Peroral, Single Dose to Rats
LD50 = 177 (116 to 270) mg/kg; 1 ml = 10 mg in corn oil.

Esterdiol-204 Ethoxylate Diacrylate 10-FGC-12
Sample 40-71
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 0.38.
Not an "irritant" by FHSA definition.

Esterdiol-204 Ethoxylate Diacrylate 42-RJK-43
Sample 40-156
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 0.84.
Not an "irritant" by FHSA definition.

TERGITOLS (4)

Repeated Application to Rabbit Skin

15-S-3; Sample 40-305

Mean score = 3.8 (marked erythema)

15-S-5; Sample 40-306

Mean score = 4.2 (marked erythema)

25-L-3; Sample 40-307

Mean score = 4.4 (marked erythema, some edema)

25-L-5; Sample 40-303

Mean score = 3.8 (marked erythema)

Triphenol P

Sample 40-249

Repeated Application to Rabbit Skin

Mean score = 4.4 (marked erythema, some edema)

UCON Lubricant 50-HB-55

Sample 40-131

Inhalation, Single Exposure to Rats

Substantially saturated vapor, static conditions at 26°C.

8 hours killed 0 of 6.

UCON Lubricants (7)

Repeated Application to Rabbit Skin

17-PHT-18, Experimental; Sample 40-208

Mean score = 7.2 (necrosis)

50-HB-170 + 10% Bisphenol A; Sample 40-247

Mean score = 1.0 (capillary injection)

50-HB-170 + 10% Triphenol P; Sample 40-246

Mean score = 1.4 (capillary injection)

50-HB-660 + 10% Bisphenol A; Sample 40-245

Mean score = 1.2 (capillary injection)

50-HB-660 + 10% Triphenol P; Sample 40-244

Mean score = 1.2 (capillary injection)

50-HM-100A; Sample 40-206

Mean Score = 7.2 (necrosis)

1538-15-76, Experimental; Sample 40-205

Mean score = 7.2 (necrosis)

Project Report 41-65
6 Pages
April 14, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL 15-S-5, 2-ethylhexanoate

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 38.1 ml/kg; dosed as received.
Skin Penetration, rabbit - LD50 = 8.0 ml/kg or greater; dosed as received.
Inhalation, rat -
Substantially saturated vapor, static conditions at 23°C.
8 hours killed 0 of 6.
Repeated Uncovered Skin Application, rabbit - Mean score after 9 doses = 4.0 (marked erythema).
Eye Injury, rabbit - None, Grade 1.

Interpretation

TERGITOL 15-S-5, 2-ethylhexanoate had an extremely low order of toxicity following single stomach intubation. It was probably slightly toxic following single covered dermal application (8.0 ml/kg killed 2/4; 16.0 ml/kg killed 0/4), apparently depending upon the sensitivity of the rabbits dosed. The rabbit deaths were delayed and possibly related to lung infection. Nine applications, 0.01 ml each, to uncovered rabbit skin resulted in moderate dermal irritation (marked erythema plus desquamation and fissures). Instillation of the undiluted material in rabbit eyes resulted in no corneal injury. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Samples

Quantity: 0.5 pint; 1 pint
Date Received: 12-7-77; 1-9-78
CHF Sample No.: 40-463; 41-8

Submitted By: H. S. Koenig
Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 16-PHT-136
Req. 511-01-6471;
Ref. 18-PHT-17
Req. 511-01-0032
(yellow liquid)

Charge No.: 06358

Project Report 41-67
6 Pages
April 18, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

Nonylphenol $(PO)_8(EO)_{6.5}$;26QWD102

Range Finding Toxicity and Repeated Skin Application Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 4.92 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 11.3 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 20°C.
8 hours killed 0 of 6.

Repeated Uncovered Skin Application, rabbit - Mean score after 9 doses = 4.0; marked erythema.

Eye Injury, rabbit - None, Grade 1.

Interpretation

Nonylphenol 26QWD102 was moderately toxic following single stomach intubation and was slightly toxic following single covered dermal application. Repeated applications, 0.01 ml each, resulted in moderate irritation (erythema plus desquamation and fissures) on rabbit skin. Instillation of the undiluted material in rabbit eyes resulted in no corneal injury. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions. However, repeated skin contact should be avoided.

Samples

Quantity: 2 oz; 1 pt
Date Received: 12-7-77; 1-9-78
CHF Sample No.: 40-457; 41-12

Submitted By: H. S. Koenig
Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 16-PHT-136
Req. 511-01-6471;
Ref. 18-PHT-17
Req. 511-01-0032
(viscous liquid)

Charge No.: 06358

Project Report 41-77
May 1, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics Division

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Summary

Glutaraldehyde, 25%
Sample 40-347
Skin Penetration, Single Dose to Rabbits (Retest)
LD50 = 16.0 (1.25 to 204) ml/kg; dosed as received.
(LD50 has a high degree of uncertainty because of fractional mortality at highest dosage level.)

Heavy Duty Liquid (HDL) Detergent 6658-29-11
Sample 41-72
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 7.50.
An "irritant" by FHSA definition.

SIMONIZ Professional Cleaner/Wax (AS-908W)
Sample 40-480
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 7.96.
An "irritant" by FHSA definition.

TERGITOL HDL 6559-21A
Sample 40-391
Peroral, Single Dose to Rats (FHSA conditions)
LD50 = 8.41 (3.36 to 21.0) ml/kg; dosed as received.
Not "toxic" by FHSA definition.
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 5.71
An "irritant" by FHSA definition.
Eye Irritation, Covered, Rabbit FHSA Test
6 of 6 eyes "positive".
An "irritant" by FHSA definition.

TERGITOL HDL 6559-21B
Sample 40-392
Peroral, Single Dose to Rats (FHSA conditions)
LD50 = 10.0 ml/kg; dosed as received.
Probably not "toxic" by FHSA definition.
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 5.50
An "irritant" by FHSA definition.
Eye Irritation, Covered, Rabbit FHSA Test
6 of 6 eyes "positive".
An "irritant" by FHSA definition.

TERGITOL HDL 6559-74A
Sample 40-437
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 6.38.
An "irritant" by FHSA definition.

TERGITOL HDL 6559-74B
Sample 40-438
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 6.38.
An "irritant" by FHSA definition.

TERGITOL Surfactant HDL-E
Sample 40-498
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 5.96.
An "irritant" by FHSA definition.

UCAR Latex AX-9304
Sample 40-445
Repeated Application to Rabbit Skin
9 doses, 0.01 ml each, in 3 days.
Mean score after 9th dose = 1.2; moderate capillary injection (trace irritation).

UCAR Latex AX-9305
Sample 40-446
Repeated Application to Rabbit Skin
9 doses, 0.01 ml each, in 3 days.
Mean score after 9th dose = 2.6; moderate erythema (minor irritation).

Urethane Acrylate Coating 24-LEH-X-10
Sample 40-405
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 6.00.
An "irritant" by FHSA definition.

Project Report 41-82
5 Pages
May 11, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

Nonylphenol $(PO)_{10}(EO)_5$

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 7.46 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 25°C.
8 hours killed 0 of 6.

Repeated Uncovered Skin Application, rabbit - Mean score after 9th dose = 3.8; marked erythema plus desquamation and fissures.

Eye Injury, rabbit - Minor, Grade 3.

Interpretation

Nonylphenol $(PO)_{10}(EO)_5$ was slightly toxic following single stomach intubation. Nine applications, 0.01 ml each, resulted in moderate irritation to rabbit skin. Instillation of the undiluted material resulted in minor corneal injury, with iritis, in rabbit eyes. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 0.5 pint Date Received: 12-7-77 CHF Sample No.: 40-459

Submitted By: H. S. Koenig Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 16-PHT-136
Req. 511-01-6471 Charge No.: 06358

Project Report 41-85
7 Pages
May 16, 1978
Tel: (412) 327-1020

611

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL 25-L-7

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 4.00 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 26°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Covered Skin Irritation, rabbit FHSA test - Primary irritation score = 5.33; an "irritant".

Eye Injury, rabbit - Minor, Grade 3.

Eye Injury, rabbit FHSA test - 6 of 6 "positive"; an "irritant".

Interpretation

TERGITOL 25-L-7 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in trace irritation to uncovered rabbit skin and in minor corneal injury, with iritis, in rabbit eyes. When tested under Federal Hazardous Substances Act (FHSA) conditions, it was an "irritant" to rabbit eyes and covered rabbit skin. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 pint Date Received: 1-19-78 CHF Sample No.: 41-21

Submitted By: D. C. Galante Division: Chemicals and Plastics Tarrytown, NY

Identification: Notebook No. 6658-1 (white liquid at room temperature, solid at lower temperature) Charge No.: 09147

Project Report 41-86
7 Pages
May 18, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

Neodol 25-7

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 3.25 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 5.66 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 24°C.
8 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Covered Skin Irritation, rabbit FHSA test - Primary irritation score = 6.25; an "irritant".

Eye Injury, rabbit - Minor, Grade 4.

Eye Injury, rabbit FHSA test - 6 of 6 "positive"; an "irritant".

Interpretation

Neodol 25-7 was moderately toxic following single stomach intubation and slightly toxic following single covered dermal application. Administration of the undiluted material resulted in minor irritation to uncovered rabbit skin and in minor to moderate corneal injury, with iritis, in rabbit eyes. When tested under Federal Hazardous Substances Act (FHSA) conditions, it was an "irritant" to rabbit eyes and covered rabbit skin. No hazard is anticipated from the infrequent inhalation of substantially saturated vapor evolved at room temperature under normal handling conditions.

Sample

Quantity: 1 pint
Date Received: 1-19-78
CHF Sample No.: 41-22

Submitted By: D. C. Galante
Division: Chemicals and Plastics
Tarrytown, NY

Identification: Notebook No. 6658-2
(white liquid at room temperature, solid at lower temperature)
Charge No.: 09147

Project Report 41-101
4 Pages
June 19, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic Surfactant 25-L-3

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

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Summary

Stomach Intubation, rat - LD50 = 11.3 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 2.83 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Trace, Grade 1.

Interpretation

TERGITOL Nonionic Surfactant 25-L-3 was slightly toxic following single stomach intubation and was moderately toxic following single covered dermal application. Administration of the undiluted material resulted in minor irritation to rabbit skin and in trace corneal injury to 2 of 5 rabbit eyes.

This sample represents a new production process. TERGITOL 25-L-3 had been previously tested and the results appeared in CHF Report 40-17 (1977). The previous sample was somewhat less toxic, especially by skin penetration, but was similar in the skin and eye irritation produced. Repeated application of the older material produced moderate irritation to rabbit skin (Report 40-141).

Sample

Quantity: 1 qt Date Received: 4-20-78 CHF Sample No.: 41-164

Submitted By: R. R. Fields Division: Chemicals and Plastics, South Charleston, WV

Identification: 14-RRF-117
Reg. 511-01-1985
(cloudy liquid)

Charge No.: 03578

Project Report 41-105
4 Pages
June 22, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic Surfactant 25-L-7

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.46 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 1.26 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Moderate, Grade 5.

Interpretation

TERGITOL Nonionic Surfactant 25-L-7 was moderately toxic following single stomach intubation and covered dermal application routes of administration. Application of the undiluted material resulted in minor irritation to rabbit skin and in moderate corneal injury, with iritis, in rabbit eyes.

This sample represents a new production process. TERGITOL Nonionic Surfactant 25-L-7 had been previously tested and the results appeared in CHF Report 40-23. The latest results were very similar to the previous results except that the new sample was less irritating to the eyes (Grade 5 compared to Grade 8).

Sample

Quantity: 1 qt. Date Received: 4-20-78 CHF Sample No.: 41-165

Submitted By: R. R. Fields Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 14-RRF-114
511-01-1985 (pulpy white semi-liquid at room temperature) Charge No.: 03578

Project Report 41-128
4 Pages
September 7, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic 25-L-7 (17RRF-72-2)

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 1.68 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Nonionic 25-L-7 (17RRF-72-2) was moderately toxic following single stomach intubation and covered dermal application routes of administration. Evidence of lung infection, resulting in delayed deaths, was noted following the dermal doses. Application of the undiluted material resulted in trace irritation to rabbit skin. The undiluted and diluted (distilled water) material produced moderate to severe corneal injury, with iritis, in rabbit eyes.

Sample

Quantity: 1 quart Date Received: 6-15-78 CHF Sample No.: 41-221

Submitted By: R. R. Fields Division: Chemicals and Plastics South Charleston, WV

Identification: 17RRF-72-2
Ref. 511-01-3132
(viscous white liquid)

Charge No.: 03578

Project Report 41-130
4 Pages
September 18, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pa. 15213

TERGITOL Nonionic 25-L-7 (17RRF-72-1)

Range Finding Toxicity Studies

Sponsor: *Union Carbide Corporation*

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 5.66 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Nonionic 25-L-7 (17RRF-72-1) was moderately toxic following single stomach intubation and was slightly toxic following single covered dermal application. Deaths from the dermal doses were delayed somewhat, a finding observed frequently for the TERGITOLs; this is possibly a result of lung infection. Application of the undiluted material resulted in trace irritation to rabbit skin. The undiluted material produced severe corneal injury, with iritis, and the diluted material produced moderate injury in rabbit eyes.

Sample

Quantity: 1 qt Date Received: 6-15-78 CHF Sample No.: 41-220

Submitted By: R. R. Fields Division: Chemicals and Plastics, South Charleston, WV

Identification: 17-RRF-72-1
511-01-3132
(viscous white liquid)

Charge No.: 03578

CONFIDENTIAL: Not to be released outside UCC without the written consent of the C&P Medical Director, Occupational Health Team Operations Manager, or Product Safety Director.

Project Report 41-158 1313
November 16, 1978
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

Miscellaneous Toxicity Studies

Sponsor: *Union Carbide Corporation*, Chemicals and Plastics Division

* * * * *

Summary

Antifoam SB
Sample 41-311
Peroral, Single Dose to Rats
LD50 = 39.4 (28.6 to 54.2) ml/kg; dosed as received.

Anti-Rust Test Sample MI1012 A
Sample 41-266
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 0.34.
Not a skin "irritant" by Federal Hazardous Substances Act (FESA) definition.
Eye Irritation, Rabbit FHSA Test
0 of 6 eyes "positive".
Not an eye "irritant" by FHSA definition.

Anti-Rust Test Sample MI1012 B
Sample 41-267
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 0.33.
Not a skin "irritant" by FHSA definition.
Eye Irritation, Rabbit FHSA Test
0 of 6 eyes "positive".
Not an eye "irritant" by FHSA definition.

Delco Supreme 11 Brake Fluid
Sample 41-186
Skin Irritation, Covered, Rabbit FHSA Test
Primary irritation score = 0.25.
Not a skin "irritant" by FHSA definition.
Eye Irritation, Rabbit FHSA Test
0 of 6 eyes "positive".
Not an eye "irritant" by FHSA definition.

CLASSIFICATION OF CORROSIVE HAZARDS

Title 49 - Transportation
Chapter 1 - Hazardous Materials Regulations Board
Department of Transportation

Amended §1500.41 to provide a quantitative definition for corrosive materials by utilization of a 4-hr exposure time and nonabraded skin, in the rabbit test as otherwise described in Title 16, Chapter 11, §1500.41, Consumer Product Safety Commission.

PRODUCT	CHF SAMPLE NO.	RESULTS AND CONCLUSION
TERGITOL Surfactant AG-1; PM5839	41-201	0 of 6 rabbits with necrosis; therefore, not a "corrosive" material.
Vanzak Surfactant 165; PM5827	41-209	0 of 6 rabbits with necrosis; therefore, not a "corrosive" material.

Project Report 42-54
6 Pages
June 5, 1979
Tel: (412) 327-1020

CHEMICAL HYGIENE FELLOWSHIP
Carnegie-Mellon Institute of Research
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic 25-L-7 (17-RRF-125)

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Stomach Intubation, rat - LD50 = 2.38 ml/kg; dosed as received.

Skin Penetration, rabbit - LD50 = 3.56 ml/kg; dosed as received.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Moderate, Grade 5.

Interpretation

TERGITOL Nonionic 25-L-7 (17-RRF-125) was moderately toxic following single stomach intubation and covered dermal application routes of administration. Delayed times to death, an observation frequently encountered with past studies on TERGITOLS, indicated possible persistent toxic effect. Application of the undiluted material resulted in minor irritation to rabbit skin and in moderate corneal injury, with iritis, in rabbit eyes.

Sample

Quantity: 1 quart

Date Received: 3-1-79

CHF Sample No.: 42-112

Submitted By: R. R. Fields

Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 17-RRF-125
Reg. No. 511-01-0979
(milky white liquid)

Charge No.: 04511

CONFIDENTIAL: Not to be released outside UCC without the written consent of the UCC component sponsoring the work.

Project Report 43-9
6 Pages
February 26, 1980
Tel: (412) 327-1020

BUSHY RUN RESEARCH CENTER
Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, PA 15213

TERGITOL Nonionic Surfactant NP-6

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 5.61 ml/kg; dosed as received.

Percutaneous, rabbit - LD50 = 4.00 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, dynamic conditions at 21°C.
6 hours killed 0 of 6

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Nonionic Surfactant NP-6 was slightly toxic following single peroral intubation and was moderately toxic following single percutaneous application. Administration of the undiluted material resulted in trace irritation to rabbit skin and severe corneal injury, with iritis, in rabbit eyes; a 15% dilution also produced severe corneal injury. Single inhalation of substantially saturated vapor resulted in neither mortality nor observed signs of toxicity.

Sample

Quantity: 1 quart Date Received: 8/31/79 CHF Sample No.: 42-355

Submitted By: P. A. Munday Division: Chemicals and Plastics
South Charleston, WV

Identification: Ref. 17-PAM-144
Reg. 511-01-4499
(clear liquid)

Charge No.: 06200

BUSHY RUN RESEARCH CENTER

Mailing Address: Mellon Institute 4400 Fifth Avenue Pittsburgh, PA 15213 (412) 327-1020

Project Report 43-82
4 Pages
Tel: (412) 327-1020
October 9, 1980

TERGITOL Surfactant SF-2

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 5.66 ml/kg; dosed as received.

Percutaneous, rabbit - LD50 = 1.41 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 25°C
6 hours killed 0 of 6; signs of toxicity noted.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Surfactant SF-2 was slightly toxic following single peroral intubation and was moderately toxic following single covered percutaneous application. Delayed times to death indicated persistent toxic effect and the possibility for cumulative toxicity by the percutaneous route. This along with noted lung pathology, was consistent with results from toxicity studies on other TERGITOLS. Administration of the undiluted material resulted in minor irritation to rabbit skin. Instillation of the undiluted or diluted sample into rabbit eyes produced moderate to severe corneal injury. A single inhalation exposure to substantially saturated vapor resulted in no mortality but signs of toxicity included hypoactivity, coordination loss, prostration and pinpoint pupils.

Sample

Quantity: 32 oz. Date Received: 1/18/80 CHF Sample No.: 43-31

Submitted By: L. F. Theiling Division: Chemicals and Plastics
South Charleston, WV

Identification: PM-5831
S-671185
(clear liquid)

Charge No.: 04511

CONFIDENTIAL: Not to be released outside UCC without the written consent of the UCC component sponsoring the work.

Project Report 43-84
4 Pages
Tel: (412) 327-1020
October 3, 1980

TERGITOL Surfactant SC-1

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 2.59 ml/kg, dosed as received.

Percutaneous, rabbit - LD50 = 5.66 ml/kg, dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 24°C
6 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Surfactant SC-1 was moderately toxic following single peroral intubation and was slightly toxic following single covered percutaneous application. Weight loss and delayed times to death after the percutaneous dosing suggested persistent toxic effect and the possibility for cumulative toxicity. These findings and the observed lung pathology are consistent with previous results from TERGITOLS. Administration of the undiluted material resulted in minor irritation to uncovered rabbit skin. Instillation of the undiluted or diluted sample produced severe corneal injury, with iritis, in rabbit eyes. A single inhalation exposure to substantially saturated vapor at room temperature resulted in neither mortality nor observed signs of toxicity.

Sample

Quantity: 32 oz. Date Received: 1/18/80 CHF Sample No.: 43-33

Submitted By: L. F. Theiling Division: Chemicals and Plastics
South Charleston, WV

Identification: PM-5871
S-671186
(clear liquid)

Charge No.: 04511

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Mailing Address: Mellon Institute 4400 Fifth Avenue Pittsburgh, PA 15213 (412) 327-1020

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Project Report 43-85
4 Pages
Tel: (412) 327-1020
October 3, 1980

TERGITOL Surfactant MW-3

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 5.19 ml/kg, dosed as received.

Percutaneous, rabbit - LD50 = 1.68 ml/kg, dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 25°C
6 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Minor, Grade 3.

Eye Injury, rabbit - Severe, Grade 8.

Interpretation

TERGITOL Surfactant MW-3 was slightly toxic following single peroral intubation and moderately toxic following single percutaneous application. Delayed times to death, especially following percutaneous application, indicate persistent toxic effect and the possibility for cumulative toxicity. Several TERGITOLS have been tested previously and this finding along with lung pathology, has been observed. Administration of the undiluted material resulted in minor irritation to uncovered rabbit skin. Instillation of the undiluted or diluted sample produced severe corneal injury, with iritis, in rabbit eyes. A single 6 hour inhalation exposure to substantially saturated vapor resulted in neither mortality nor observe signs of toxicity.

Sample

Quantity: 32 oz. Date Received: 1/18/80 CHF Sample No.: 43-32

Submitted By: L. F. Theiling Division: Chemicals and Plastics
South Charleston, WV

Identification: PM 5808
S-671184
(clear liquid)

Charge No.: 04511

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Mailing Address: Mellon Institute 4400 Fifth Avenue Pittsburgh, PA 15213 (412) 327-1020

CONFIDENTIAL: Not to be released outside UCC without the written consent of the UCC component sponsoring the work.

Project Report 43-87
4 Pages
Tel: (412) 327-1020
October 3, 1980

Alcohol Alkoxylate #1 (Experimental)

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 5.19 ml/kg, dosed as received.

Percutaneous, rabbit - LD50 = 5.04 ml/kg, dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 23°C
6 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Minor, Grade 3.

Interpretation

Alcohol Alkoxylate #1 was slightly toxic following single peroral intubation and covered percutaneous application. Delayed times to death from these routes indicated persistent toxic effect and the possibility for cumulative toxicity. Application of the undiluted material resulted in trace irritation to rabbit skin and in minor corneal injury, with iritis, in rabbit eyes. Single inhalation, by rats, of substantially saturated vapor for a 6-hr period at room temperature resulted in neither mortality nor observed signs of toxicity.

Sample

Quantity: 1 qt. Date Received: 4/16/80 BRRC Sample No.: 43-139

Submitted By: P. A. Munday Division: Chemicals and Plastics
South Charleston, WV

Identification: 18-PAM-72
511-01-1651
(clear liquid)

Charge No.: 05198

BUSHY RUN RESEARCH CENTER

Mailing Address: Mellon Institute 4400 Fifth Avenue Pittsburgh, PA 15213 (412) 327-1020

Project Report 43-88
4 Pages
Tel: (412) 327-1020
October 15, 1980

Alcohol Alkoxylate #2 (Experimental)

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 2.83 ml/kg; dosed as received.

Percutaneous, rabbit - LD50 = 10.1 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 23°C
6 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Trace, Grade 2.

Interpretation

Alcohol Alkoxylate #2 was moderately toxic following single peroral intubation and was slightly toxic following single covered percutaneous application. Delayed times to death following the percutaneous route indicated persistent toxic effect and the possibility for cumulative toxicity. Administration of the undiluted material resulted in trace irritation to rabbit skin and eyes. A single inhalation exposure to substantially saturated vapor at room temperature resulted in neither mortality nor observed signs of toxicity.

Sample

Quantity: 1 qt. Date Received: April 16, 1980 BRRC Sample No.: 43-140

Submitted By: P. A. Munday Division: Chemicals and Plastics
South Charleston, WV

Identification: 18-PAM-69
511-01-1651
(slightly viscous, clear liquid)

Charge No.: 05198

BUSHY RUN RESEARCH CENTER
Mailing Address: Mellon Institute 4400 Fifth Avenue Pittsburgh, PA 15213 (412) 327-1020

CONFIDENTIAL: Not to be released outside UCC without the written consent of the UCC component sponsoring the work.

Project Report 43-111
3 Pages
Tel: (412) 327-1020
October 31, 1980

Miscellaneous Samples Tested by the Department of Transportation (D.O.T.) Skin Corrosivity Procedure

Sponsor: Union Carbide Corporation

* * * * *

Summary

Of the 5 materials studied (listed below) only one was "corrosive" by the 4-hour covered rabbit skin test. This was the dimethylisopropanolamine, 77% in water.

Samples

Material	Amount Received	Date Received	Identification	Submitted by:	Location	Charge No.	BRRC Sample No.
Dimethyl-isopro-panol-amine; received as 77% in water	1 qt.	Aug. 27, 1980	52-CNH-16 (clear liquid)	C. F. Hauser	South Charleston, WV	05031	43-261
Leached catalyst*	450 g	July 11, 1980	Round, white pellets	W. H. Stratton	South Charleston, WV	-	43-221
Methyl-diethanol-amine	1 qt.	Aug. 8, 1980	47-CNH-126 (golden liquid)	C. F. Hauser	South Charleston, WV	05506	43-250
TERGITOL Nonionic Surfac-tant TP-2 (PM5916)	1 qt.	July 30, 1980	S-699525 (white, waxy solid)	SHARE (H. L. Cox)	South Charleston, WV	908090	43-241
UCARSOL HS	1 qt.	Aug. 8, 1980	47-CNH-126 (golden liquid)	C. F. Hauser	South Charleston, WV	05506	43-251

*This sample apparently corroded the metalic end of the container as evidenced by the dark staining of the plastic bag holding the sample and the rusty and perforated condition of the shipping tube. Material most distant from the point of contact with the container was used for the test.

CLASSIFICATION OF CORROSIVE HAZARDS

Title 42 - Transportation
Chapter 1 - Hazardous Materials Regulations Board
Department of Transportation

Amended §1500.41 to provide a quantitative definition for corrosive materials b utilization of a 4-hr exposure time and nonabraded skin, in the rabbit test as otherwise described in Title 16, Chapter 11, §1500.41, Consumer Product Safety Commission.

PRODUCT	BRRC SAMPLE NO.	RESULTS AND CONCLUSIONS
Dimethylisopropanolamine (77% in water)	43-261	2 of 2 rabbits with necrosis; therefo a "corrosive" material.
Leached catalyst (0.5 gm per rabbit of dry ground sample)	43-221	0 of 6 rabbits with necrosis; therefo not a "corrosive" material.
Methyldiethanolamine	43-250	0 of 6 rabbits with necrosis; therefo not a "corrosive" material.
TERGITOL Nonionic Surfactant TF-2 (PM5916)	43-241	0 of 6 rabbits with necrosis; therefo not a "corrosive" material.
UCARSOL HS	43-251	0 of 6 rabbits with necrosis; therefo not a "corrosive" material.

BUSHY RUN RESEARCH CENTER
R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 327-1020

Project Report 44-70
4 Pages
Tel: (412) 327-1020
June 25, 1981

Experimental Nonionic Surfactant LF-05

Range Finding Toxicity Studies

Sponsor: Union Carbide Corporation

* * * * *

Summary

Peroral Intubation, rat - LD50 = 4.00 ml/kg; dosed as received.

Percutaneous, rabbit - LD50 = 3.17 ml/kg; dosed as received.

Inhalation, rat -
Substantially saturated vapor, static conditions at 22°C.
6 hours killed 0 of 6.

Uncovered Skin Irritation, rabbit - Trace, Grade 2.

Eye Injury, rabbit - Severe from 0.5 ml per eye, minor from 0.02 ml; Grade 4.

Interpretation

Experimental Nonionic Surfactant LF-05 was moderately toxic following single peroral intubation and covered percutaneous application. Delayed times to death and lack of weight gain indicated persistent toxic effect and the possibility of cumulative toxicity by the percutaneous route. Administration of the undiluted material resulted in trace irritation to rabbit skin and in minor to severe corneal injury (depending on the volume dosed), with eyelid injury and iritis, in rabbit eyes. Acute inhalation exposure to substantially saturated vapor resulted in neither mortality nor observed signs of toxicity.

Sample

Quantity: 0.5 gal.

Submitted By: Q. W. Decker

Date Received: April 9, 1981

Division: Ethylene Oxide Derivatives
South Charleston, WV

Identification: Ref. No. 25FH21;
Reg. No 1596
(pale yellow, clear, watery liquid)

Charge No.: 05131

BRRC Sample No.: 44-123

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

Project Report 46-85
15 Pages
August 2, 1983

TERGITOL Nonionic 24-L-60

Acute Toxicity and Primary Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide Derivatives Division

* * * * *

Summary

Peroral, Rat (Fasted)
Males: LD50 = 2.46 ml/kg; sample dosed as received.
Females: LD50 = 1.07 ml/kg; sample dosed as received.

Percutaneous, Rabbit
Males: LD50 = 0.545 ml/kg; sample dosed as received.
Females: LD50 = 2.83 ml/kg; sample dosed as received.

Inhalation, Rat; Substantially Saturated Vapor (Static)
Males: 6 hours killed 0 of 5
Females: 6 hours killed 0 of 5

Skin Irritation, Rabbit
Moderate to severe erythema on 6 of 6 rabbits, moderate edema on 6, necrosis on 5 from 0.5 ml; irritation persisting through 14 days.

Eye Irritation, Rabbit
Moderate corneal injury in 6 of 6 eyes, moderate iritis in 6, moderate to severe conjunctival irritation in 6 from 0.005 ml; corneal vascularization in 5 eyes, persisting in 2 through 21 days.

Interpretation

TERGITOL Nonionic 24-L-60 was moderately toxic following single peroral intubation and single percutaneous application. Delayed deaths by the percutaneous route indicates persistent toxic effect and the potential for chronicity. Single inhalation exposure to substantially saturated vapor did not kill any of 5 male or 5 female rats and no signs of inhalation toxicity were noted. Application to covered rabbit skin produced persistent, moderate to severe irritation, with necrosis (a D.O.T. "corrosive"). Instillation of 0.005 ml of sample into rabbit eyes produced severe, persistent injury.

Samples

Quantity: 1 quart; 1 quart

Date Received: March 3, 1983;
May 24, 1983

Description: Moderately viscous, translucent, gray-white liquid

Identification: 55CNH64, Reg. No. 0787;
55CNH64, Reg. No. 1973

Submitted by: C. F. Hauser

Division: Ethylene Oxide Derivatives
South Charleston, WV

Charge No.: 05901

BRRC Sample No.: 46-55; 46-140

Approximately 20 ml of the remaining sample will be retained for 2 years following issuance of this report.

Procedures

Descriptions of the test procedures are included in the attached standard test procedures section.

Results

Results of the peroral, percutaneous, inhalation, skin irritation and eye irritation tests are given in Tables 1 through 5, respectively. Eye test results are summarized in Table 6.

The peroral LD50 for male rats receiving TERGITOL Nonionic 24-L-60 was 2.46 ml/kg. That for females was 1.07 ml/kg. Sluggishness, lacrimation, slow breathing, piloerection and prostration were among the signs of toxicity observed. Death occurred at 2 hours to 4 days. Survivors recovered at one to 2 days. Findings at necropsy included mottled and red lungs, liquid- and gas-filled stomachs and liquid- and gas-filled intestines. These conditions were evident in most victims, but no remarkable gross lesions were apparent in the survivors.

By the percutaneous route, the LD50 was 0.545 ml/kg for male rabbits and 2.83 ml/kg for females. Skin reaction included erythema, edema, ecchymosis, desquamation and fissuring. Sluggishness, unsteady gait, discharge, diarrhea, emaciation and prostration were recorded. Deaths occurred at 2 to 13 days. Delayed times to death and the persistent emaciation indicated prolonged toxic effect and the potential for chronicity. At necropsy, lungs appeared mottled and red, livers were mottled or covered with white striations, tracheas had red patches and intestines contained firm fecal material.

Exposure to substantially saturated vapor for a 6-hour period resulted in no deaths among 5 male and 5 female rats. No signs of toxicity were evident during exposure or during the subsequent observation period. Gross pathologic examination revealed no remarkable findings.

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

Project Report 46-103
14 Pages
September 23, 1983

Various NEODOL and TERGITOL Samples

Primary Skin Irritancy Studies

Sponsor: UNION CARBIDE CORPORTION
Ethylene Oxide Derivatives Division

* * * * *

Summary

Each of 10 NEODOL or TERGITOL samples was applied to the covered skin of 6 albino rabbits according to the standard 4-hr irritancy test. For liquids, a volume of 0.5 ml was dosed; for viscous liquids or solids, 0.5 g was dosed. Skin reactions were evaluated through 7 days.

Results were similar for each material tested. Minor to moderate erythema and minor to moderate edema developed within one day after dosing. Irritation remained constant or, in some cases, increased somewhat in severity at 2 to 3 days. By 7 days, the erythema and edema on most rabbits had become less severe. These conditions were not present on several animals at the 7-day examination, but fissuring and desquamation was apparent on nearly all rabbits.

Samples

Material	Identification	Description	BRRC Sample No.
NEODOL 25-7	-	Transparent, slightly viscous liquid	46-212
NEODOL 25-9	-	White, cloudy, slightly viscous liquid, with white solid on bottom	46-215
TERGITOL 15-S-7	Lot 300663	Pale yellow, transparent, slightly viscous liquid	46-213
TERGITOL 24-L-3	Lot 104562016-3-62183	Transparent, slightly viscous liquid	46-210

Material	Identification	Description	BRRC Sample No.
TERGITOL 24-L-3 NMW	Lot 104561608-F	Pale yellow, transparent, slightly viscous liquid	46-209
TERGITOL 24-L-50	Lot 104562614-3-62383	Transparent, slightly viscous liquid	46-207
TERGITOL 24-L-60	Lot 104562623-62483	Transparent, slightly viscous liquid	46-208
TERGITOL 24-L-60 NMW	Lot 104561614-51883-F	Transparent, slightly viscous liquid	46-205
TERGITOL 24-L-92	Lot 89564810-2-12882	White, opaque solid	46-214
TERGITOL 24-L-92 NMW	Lot 10456123-51483	Cloudy, slightly viscous liquid	46-206

One quart of each sample was received from K.W. Dillan, Union Carbide Ethylene Oxide Derivatives Division, Tarrytown, NY on August 4, 1983. The sponsor's charge number for irritancy testing was 02365.

Procedure

The standard test procedure for primary skin irritation appears in Appendix I. For liquid samples, 0.5 ml of sample was applied while 0.5 g of solid or viscous liquids was applied.

Results

Skin irritation results from the individual test materials are presented in Tables 1 through 10. A summary of irritation scores is given in Table 11.

The nature and severity of skin reaction observed appeared to be similar for each material tested. Several rabbits developed minor erythema and edema within one hour after the end of the contact period. By one day, most dosed spots had minor to moderate erythema and edema. In most instances, irritation remained constant or increased in severity somewhat during the first 2 to 3 days after dosing. Erythema and edema disappeared or became considerably less severe after 7 days, but fissuring and desquamation were present.

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Project Report 46-115
13 Pages
October 4, 1983

TERGITOL Nonionic Surfactant 24-L-50 NMW

Acute Toxicity and Primary Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide Derivatives Division

* * * * *

Summary

Peroral, Rat (Fasted)
Males: LD50 = 3.73 ml/kg; sample dosed as received.
Females: LD50 = 2.14 ml/kg; sample dosed as received.

Percutaneous, Rabbit
Males: LD50 = 1.41 ml/kg; sample dosed as received.
Females: LD50 = 0.812 ml/kg; sample dosed as received.

Skin Irritation, Rabbit
Moderate erythema on 6 of 6 rabbits, minor to moderate edema on 6; minor irritation persisting through 7 days.

Eye Irritation, Rabbit
Moderate corneal injury in 6 of 6 eyes, moderate iritis in 5, moderate to severe conjunctival irritation in 6 from 0.005 ml; irritation persisting in one through 21 days.

Interpretation

TERGITOL Nonionic Surfactant 24-L-50 NMW was moderately toxic following single peroral intubation and single percutaneous application. Delayed deaths by the percutaneous route indicated persistent toxic effect. A 4-hour application to covered rabbit skin produced persistent, moderate irritation. Instillation of 0.005 ml of sample into rabbit eyes produced moderate to severe injury.

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Project Report 46-143
13 Pages
January 4, 1984

TERGITOL Nonionic Surfactant 24-L-98 NMW

Acute Toxicity and Primary Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide Derivatives Division

* * * * *

Summary

Peroral, Rat (Fasted)
Males: LD50 = 1.27 ml/kg; sample dosed undiluted (melted).
Females: LD50 = 0.730 ml/kg; sample dosed undiluted (melted).

Percutaneous, Rabbit
Males: LD50 = 1.87 ml/kg; sample dosed undiluted (melted).
Females: LD50 = 2.00 ml/kg; sample dosed undiluted (melted).

Skin Irritation, Rabbit (4-Hr Occluded)
Minor to moderate erythema on 6 of 6 rabbits, minor edema on 3 from 0.5 ml (melted); minor erythema persisting on 2 through 7 days; desquamation at 3 to 14 days..

Eye Irritation, Rabbit
Moderate to severe corneal injury in 6 of 6 eyes, moderate iritis in 6, moderate to severe conjunctival irritation in 6 from 0.01 ml (melted) and from 0.005 ml; corneal vascularization developing in most eyes within 7 days; injury persisting through 21 days.

Interpretation

TERGITOL Nonionic Surfactant 24-L-98 NMW was moderately toxic following single peroral intubation and single percutaneous application . Delayed deaths by the percutaneous route indicated persistent toxic effect. A 4-hour application to covered rabbit skin produced moderate, persistant irritation. Instillation of 0.01 ml or 0.005 ml of sample into rabbit eyes produced persistent moderate to severe injury.

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Project Report 47-41
22 Pages
April 19, 1984

Detergent Powder Samples (10640-10-1 to 10640-10-6)

Primary Eye Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide/Glycol Division

* * * * *

Summary

Each of 6 detergent formulations was instilled into 6 albino rabbit eyes. An amount of formulation approximately equivalent to 0.1 ml (90 mg) was administered to each test eye. Observations were made over a 21-day period.

Results were similar for each material tested. Severe conjunctival hemorrhaging and edema, along with moderate to severe corneal injury were apparent within one hour after dosing. Necrosis on the conjunctivae and nictitating membrane developed within 24 hours. Corneal vascularization and an irregularly shaped cornea appeared in most eyes after 7 to 14 days. In several animals, corneal cysts were evident. Although there was some improvement in the eyes after 21 days (especially in the conjunctival effects and corneal opacity), there was considerable damage still apparent. Many eyes displayed corneal vascularization, irregularly shaped corneas, a fleshy corneal coating, moderate corneal opacity and moderate to severe conjunctival irritation at the final examination.

Samples

Approximately 50 grams of each formulation was received from G.C. Johnson, Union Carbide Ethylene Oxide/Glycol Division, Tarrytown, NY on January 20, 1984. Each material, as received by the Bushy Run Research Center (BRRC) was a blue powder. The 6 formulations were coded 10640-10-1 through 10640-10-6. BRRC Sample Numbers 47-25 through 47-30 were assigned to these materials. The sponsor's charge number for irritancy testing was 570525-576700-471.

Approximately 20 g of each formulation will be retained for 2 years following issuance of this report.

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Project Report 47-66
13 Pages
May 11, 1984

TERGITOL Nonionic 24-L-3 NMW

Acute Toxicity and Primary Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide Derivatives Division

* * * * *

Summary

Peroral, Rat (Fasted)
Males: 16.0 g/kg killed 0 of 5 (signs noted); sample dosed as received.
Females: LD50 = 4.00 ml/kg; sample dosed as received.

Percutaneous, Rabbit
Males: LD50 = 2.14 ml/kg; sample dosed as received.
Females: LD50 = 2.00 ml/kg; sample dosed as received.

Eye Irritation, Rabbit
Minor to moderate corneal injury (with vascularization in several), moderate iritis, moderate to severe conjunctival irritation from 0.01 ml and from 0.005 ml.

Interpretation

TERGITOL Nonionic 24-L-3 NMW was of low (males) to moderate (females) toxicity following single peroral intubation. It was moderately toxic following single dermal application. Delayed times to death of several animals by these routes indicated persistent toxic effect. Instillation of 0.01 or 0.005 ml into rabbit eyes resulted in moderate persistent irritation.

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Project Report 47-96
28 Pages
June 26, 1984

Detergent Powder Samples (10640-10-7 to 10640-10-11)

Primary Eye Irritancy Studies

Sponsor: Union Carbide Corporation
Ethylene Oxide/Glycol Division

* * * * *

Summary

Each of 5 detergent formulations was instilled into the eyes of albino rabbits. Initially one eye was dosed per formulation. For 2 materials (labeled 10640-10-9 and 10640-10-10), additional sets of 6 eyes each were tested. An amount of formulation approximately equivalent to 0.1 ml (90 mg) was administered to each test eye. Observations were made over a 21-day period.

Results were similar for each material tested. Severe conjunctival hemorrhaging and edema, along with moderate to severe corneal injury were apparent within one hour after dosing. Necrosis on the conjunctivae and nictitating membrane developed within 24 hours. Corneal vascularization appeared in most eyes after 7 to 14 days. In several animals, corneal ulceration was evident. Although there was some improvement in the eyes after 21 days (especially in the conjunctival effects and corneal opacity), there was considerable damage still apparent. Many eyes displayed corneal vascularization, a fleshy corneal coating, moderate to severe corneal opacity and moderate to severe conjunctival irritation at the final examination.

One possible exception to this pattern was noted for the material coded 10640-10-9. Corneal effects were less severe in some eyes receiving this formulation. Two of the 7 eyes dosed were healed within 14 days. Three more developed a normal appearance within 21 days. However, 2 eyes remained severely injured through 21 days. Another formulation, 10640-10-10, produced severe injury in all eyes, but 2 eyes were completely healed after 21 days.

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Project Report 48-177
14 Pages
January 20, 1986

Hyflow SuperCel/TERGITOL 24-L-98N Surfactant Filter Cake (60% in Water)

Acute Toxicity and Primary Irritancy Studies

Sponsor: Ethylene Oxide/Glycol Division
Union Carbide Corporation

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SUMMARY

Peroral, Rat (Fasted)
Males: LD50 = 4.29 g/kg (of contained filter cake); sample dosed as a 50% (w/v) suspension in distilled water.
Females: LD50 = 2.46 g/kg (of contained filter cake); sample dosed as a 50% (w/v) suspension in distilled water.

Percutaneous, Rabbit
Males: 16.0 ml/kg killed 0 of 5; sample heated to 50°C then cooled several minutes before dosing.
Females: 16.0 ml/kg killed 0 of 5; sample heated to 50°C then cooled several minutes before dosing.

Inhalation, Rat; Substantially Saturated Vapor, Static Conditions at 24°C
Males: 6.0 hours killed 0 of 5.
Females: 6.0 hours killed 0 of 5.

Skin Irritation, Rabbit (4-hr occluded)
No irritation on any of 6 rabbits from 0.5 g; sample heated to 50°C then cooled for several minutes before dosing.

Eye Irritation, Rabbit
Moderate to severe corneal injury (with vascularization) in 6 of 6 eyes, iritis in 6, severe conjunctival irritation in 6 from 0.5 ml of a 50% suspension (injury persisted after 21 days); minor diffuse corneal injury in 2 of 6 eyes, iritis in one, moderate conjunctival irritation in 6 from 0.005 ml of a 50% suspension (all eyes healed at 7 days).

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Project Report 50-160
15 Pages
February 2, 1988

UCAR® Prewash Spotter (PWS), PM 5076

Acute Toxicity and Primary Irritancy Studies

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

* * * * *

SUMMARY

Peroral, Rat (Fasted)
Males: LD50 = 12.2 ml/kg; sample dosed as received.
Females: LD50 = 3.2 ml/kg; sample dosed as received.

Percutaneous, Rabbit
Males: LD50 = 4.7 ml/kg; sample dosed as received (severe irritation noted).
Females: LD50 = 8.0 ml/kg; sample dosed as received (severe irritation noted).

Skin Irritation, Rabbit (4-hr occluded)
Minor to moderate erythema on 5 of 6 rabbits, minor edema on 4 from 0.5 ml; no irritation, except desquamation, at 7 days.

Eye Irritation, Rabbit
No corneal injury in any of 6 eyes, iritis in 6, moderate conjunctival irritation in 6 from 0.1 ml (5 healed at 3 days); no corneal injury in any of 6 eyes, iritis in 4, minor to moderate conjunctival irritation in 6 from 0.005 ml (all healed at 2 days).

INTERPRETATION

UCAR® Prewash Spotter (PWS), PM 5076 was moderately toxic following its administration by single peroral intubation and slightly toxic following single dermal application. Severe irritation was apparent following the 24-hour toxicity test. A 4-hour application to covered rabbit skin resulted in minor to moderate irritation. Instillation of 0.1 ml of sample into rabbit eyes produced moderate irritation, and 0.005 ml produced minor to moderate irritation. No corneal effects were apparent from either volume.

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Project Report 51-3
31 Pages
June 28, 1988

Tergitol® Mechanical Dish Surfactant: Nine-Day Repeated Cutaneous Dose Toxicity Study in Albino Rabbits

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

* * * * *

SUMMARY

New Zealand White rabbits (5/sex/group) were exposed to Tergitol® Nonionic Mechanical Dish Surfactant (Tergitol® MDS-42) by occluded cutaneous application at doses of 0, 100, 250, or 500 mg/kg body weight/day (0, 0.1, 0.25, or 0.5 ml/kg/day). Tergitol® MDS-42 was administered undiluted for a total of nine applications (6 hours/day) over an 11-day period. Tergitol® MDS-42 produced a dose-related local skin irritation with animals in all treatment groups being affected. Local skin lesions included erythema, edema, exfoliation, and excoriation. Associated, dose-related increases in the incidence and severity of dermatitis, acanthosis, and hyperkeratosis at the application site were observed microscopically. No other treatment-related clinical signs of toxicity, gross necropsy or histopathologic observations, changes in food consumption, body weights, organ weights, or alterations in serum chemistry, hematology, or urinalysis measurements were observed. Based on the results of this study, Tergitol® Nonionic Mechanical Dish Surfactant is a mild skin irritant at 100 mg/kg/day and a moderate skin irritant at doses of 250 mg/kg/day and above. In addition, Tergitol® Nonionic Mechanical Dish Surfactant does not produce systemic toxicity in albino rabbits under the conditions of this study.

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Project Report 51-24
9 Pages
June 6, 1988

TERGITOL™ 24-L-60N (Various Dilutions)

Acute Peroral Toxicity Studies in the Rat

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

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SUMMARY

Peroral, Rat (Fasted); 50% Dilution in Distilled Water.
Males: LD50 = 3.25 ml/kg as dilution; 1.62 ml/kg as contained TERGITOL™
Females: 1.87 ml/kg as dilution; 0.94 ml/kg as contained TERGITOL™

Peroral, Rat (Fasted); 10% Dilution in Distilled Water.
Males: 16.0 ml/kg as dilution killed 2 of 5 (8.0 killed 0 of 5); 1.6 ml/kg as contained TERGITOL™ killed 2 of 5 (0.8 killed 0 of 5).
Females: LD50 = 9.85 ml/kg as dilution; 0.98 ml/kg as contained TERGITOL™.

Peroral, Rat (Fasted); 5.0% Dilution in Distilled Water.
Males: 16.0 ml/kg as dilution killed 0 of 5; 0.8 ml/kg as contained TERGITOL™ killed 0 of 5.
Females: 16.0 ml/kg as dilution killed 1 of 5 (8.0 killed 0 of 5); 0.8 ml/kg as contained TERGITOL™ killed 1 of 5 (0.4 killed 0 of 5).

Peroral, Rat (Fasted); 1.0% Dilution in Distilled Water.
Males: 16.0 ml/kg as dilution killed 0 of 5; 0.16 ml/kg as contained TERGITOL™ killed 0 of 5.
Females: 16.0 ml/kg as dilution killed 0 of 5; 0.16 ml/kg as contained TERGITOL™ killed 0 of 5.

INTERPRETATION

A 50% concentration of TERGITOL™ 24-L-60N in water was moderately toxic following its administration by single peroral intubation. A 10% concentration in water was slightly toxic by the same route. Concentrations

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BRRC Project Number 87-22-10937
Project Report 51-115
12 Pages
November 18, 1988

Alfonic® Ether Sulfate 1412-80

Acute Toxicity and Primary Irritancy Studies

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

* * * * *

SUMMARY

Peroral, Rat (Fasted)
Males: 16.0 ml/kg (5.1 ml/kg of contained ethoxylate) killed 0 of 5; sample dosed as received.
Females: 16.0 ml/kg (5.1 ml/kg of contained ethoxylate) killed 0 of 5; sample dosed as received.

Percutaneous, Rabbit
Males: 16.0 ml/kg (5.1 ml/kg of contained ethoxylate) killed 0 of 4; sample dosed as received.
Females: 16.0 ml/kg (5.1 ml/kg of contained ethoxylate) killed 0 of 4; sample dosed as received.

Skin Irritation, Rabbit (4-hr occluded)
Minor erythema on 2 of 6 rabbits, no edema on any of 6 from 0.5 ml; irritation subsided after 7 days.

Eye Irritation, Rabbit
No corneal injury or iritis in any of 6 eyes, minor transient conjunctival irritation in 6 from 0.1 ml (all healed at 48 hours) and from 0.005 ml (all healed at 24 hours).

INTERPRETATION

Alfonic® Ether Sulfate 1412-80 had an extremely low order of toxicity following its administration by single peroral intubation and following single cutaneous application. Microscopic examination of lungs from the rabbits subjected to the dermal test revealed some vascular lesions but no inflammatory lesions that had been evident in studies with similar test materials. A 4-hour application to covered rabbit skin resulted in minor irritation. Instillation of 0.1 or 0.005 ml of sample into rabbit eyes produced minor irritation, with no involvement of the cornea.

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BRRC Project Number 87-22-10936
Project Report 52-69
17 Pages
June 12, 1989

ALFONIC® 1412-40

Acute Toxicity and Primary Irritancy Studies

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

* * * * *

SUMMARY

Peroral, Rat (Fasted)
Males: LD50 = 9.47 ml/kg; sample dosed as received.
Females: LD50 = 5.79 ml/kg; sample dosed as received.

Percutaneous, Rabbit (First Study)
Males: LD50 = 7.1 ml/kg; sample dosed as received.
Females: LD50 = 11.3 ml/kg; sample dosed as received.

Lung histopathology included fibronecrotic pneumonia, alveolar histiocytosis and bacterial infiltration. In the GI tract there was necrosis, mineralization and hemorrhage.

Percutaneous, Rabbit (Second Study)
Males: LD50 = 5.66 ml/kg; sample dosed as received.
Females: LD50 = 6.73 ml/kg; sample dosed as received.

Microscopically, lungs exhibited inflammation, pneumonia, histiocytosis, bacterial infiltration and plant material. The GI tract had areas of necrosis and hemorrhage.

Skin Irritation, Rabbit (4-hr occluded)
Minor to moderate erythema on 6 of 6 rabbits, minor to moderate edema and desquamation on 5 from 0.5 ml; irritation (except for desquamation) subsided after 7 days.

Eye Irritation, Rabbit
Minor corneal injury in 6 of 6 eyes (gradually becoming severe in one), iritis in 6, moderate to severe conjunctival irritation in 6 from 0.005 ml; 5 eyes healed within 14 days, but one severely affected through 21 days.

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Project Report 52-104
BRRC Number 89-22-11136
36 Pages
December 21, 1989

Alcohol Sulfate Samples

Rabbit Skin and Eye Irritancy Studies

Sponsor: Industrial Chemicals Division
Union Carbide Corporation

* * * * *

SUMMARY

Skin Irritation, Rabbit (4-Hr Occluded)

(1-Dodecanol + 0.6 EO kettle product) sulfate: minor transient erythema on 2 of 6 rabbits, no other irritation from 0.5 ml; no reactions at 2 days.

1-Dodecanol sulfate: minor to moderate erythema on 6 of 6 rabbits, minor to moderate edema on 6, necrosis (mostly superficial) on 6, desquamation on 6, fissuring on 2, scabs on one, alopecia on 4 from 0.5 ml; desquamation and alopecia persisted on most rabbits at 10 days.

(1-Dodecanol + 0.6 EO) sulfate: minor to moderate erythema on 6 of 6 rabbits, minor edema on 2, desquamation on 6 from 0.5 ml; desquamation persisted at 7 days.

Tergitol© 26-L-3 sulfate: no erythema, edema or other irritation on any of 6 rabbits from 0.5 ml.

P & G CO 1214 alcohol sulfate: moderate erythema on 6 of 6 rabbits, minor to severe edema on 6, desquamation on 6, alopecia on 3 from 0.5 ml; desquamation and alopecia persisted at 7 days.

Eye Irritation, Rabbit

(1-Dodecanol + 0.6 EO kettle product) sulfate: minor to moderate corneal injury (with vascularization in one) in 6 of 6 eyes, iritis in 6, moderate conjunctival irritation (with substantial discharge) in 6 from 0.1 ml; 5 eyes healed at 7 days, one eye injured through 21 days; minor to moderate corneal injury in 2 of 6 eyes, iritis in 4, minor to moderate conjunctival irritation (with substantial discharge) in 6 from 0.01 ml; 5 eyes healed at 72 hr, one eye injured through 21 days.

1-Dodecanol sulfate: minor to moderate corneal injury in 5 of 6 eyes, iritis in 6, moderate conjunctival irritation (with substantial discharge) in 6 from 0.1 ml; all healed at 7 days; no corneal injury in any of 6 eyes, iritis in 4, minor to moderate conjunctival irritation (with substantial discharge) in 6 from 0.01 ml; all healed at 48 hr.

(1-Dodecanol + 0.6 EO) sulfate: minor corneal injury in 6 of 6 eyes, iritis in 6, moderate to severe conjunctival irritation (with substantial discharge) in 6 from 0.1 ml; all healed at 7 days; minor corneal injury in 3 of 6 eyes, iritis in 4, minor to moderate conjunctival irritation (with substantial discharge) in 6 from 0.01 ml; all essentially healed at 72 hr.

Tergitol® 26-L-3 sulfate: minor to moderate corneal injury in 6 of 6 eyes, iritis in 6, moderate conjunctival irritation (with substantial discharge) in 6 from 0.1 ml; all healed at 7 days; no corneal injury in any of 6 eyes, iritis in 2, minor conjunctival irritation (with substantial discharge) in 6; all healed at 48 hr.

P & G CO 1214 alcohol sulfate: minor to moderate corneal injury in 6 of 6 eyes, iritis in 6, moderate conjunctival irritation (with substantial discharge) in 6 from 0.1 ml; all healed at 7 days; minor corneal injury in one of 6 eyes, iritis in 5, minor to moderate conjunctival irritation (with substantial discharge) in 6 from 0.01 ml; all healed at 72 hr.

INTERPRETATION

Application of 0.5 ml to occluded rabbit skin produced the most severe effects (superficial to moderate necrosis) among animals treated with 1-dodecanol sulfate. Somewhat less severe reactions (moderate to severe irritation without necrosis) resulted from doses of P & G CO 1214 alcohol sulfate. Minor to moderate skin irritation was apparent after administration of (1-dodecanol + 0.6 EO) sulfate. The 2 least irritating samples studied were (1-dodecanol + 0.6 EO kettle product) sulfate, which produced minor transient irritation and Tergitol® 26-L-3 sulfate (no irritation evident).

Instillation of 0.1 ml and 0.01 ml of sample into rabbit eyes caused similar responses for most of the alcohol sulfates tested. Thus, ranking these materials by severity of irritation is difficult. The most severely irritating sample appeared to be (1-dodecanol + 0.6 EO kettle product) sulfate. From the higher dose volume, there was moderate ocular injury with one eye developing persistent corneal vascularization. The lower volume caused minor to moderate irritation (with persistent irritation in one). Less persistent ocular irritation resulted from 0.1 ml and 0.01 ml of (1-dodecanol + 0.6 EO) sulfate. This material was moderately irritating at the higher volume, with transient severe conjunctivitis evident in a few eyes. Minor to moderate irritation developed after administration of 0.01 ml.

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Project Report 53-83
BRRC Number 89-15-11143
24 Pages
September 19, 1990

UCON® Lubricant Samples

Assessment of Toxicity and Pulmonary Effects in the Rat Following Single Intravenous Injection

Sponsor: Specialty Chemicals Division
Union Carbide Chemicals and Plastics Company Inc.

* * * * *

SUMMARY

Seven UCON® Lubricant samples were tested for toxicity and pulmonary injury in the rat using a tail vein injection technique. When possible, the samples were administered as received (undiluted). However, dilution in physiological saline was necessary for those materials demonstrating relatively high toxicity (to permit accurate dose measurement) or high viscosity.

Following a series of preliminary tests which were conducted to establish relative toxicity and the need for sample dilution, definitive LD50s were determined for male and female rats receiving each of the lubricants. Five males and 5 females were included at each of several dosages. They were observed for clinical signs until death or sacrifice after 14 days. All animals were necropsied and the lungs of selected rats (including ones that died and ones that were sacrificed) were subjected to histopathologic evaluation.

Based on 14-day mortality data, rat intravenous (IV) LD50 values (expressed in terms of sample as received) were as follows:

UCON® Lubricant	Concentration Dosed (vehicle)	LD50, ml/kg Males	LD50, ml/kg Females
50-HB-260	10% (saline)	0.20	0.21
50-HB-660	100%	0.41	0.64
50-HB-2000	100%	1.62	2.00
50-HB-5100 (reduced)	60% (saline)	2.14	1.66
50-HB-5100	60% (saline)	2.14	2.00
75-H-1400	100%	3.25	6.73
50-H-5100	60% (saline)	4.29	4.29

The most toxic materials were those with low molecular weight (< 2000), including 50-HB-260 and 50-HB-660. The higher molecular weight samples (> 2000) exhibited low toxicity by the intravenous route.

Upon microscopic examination of the lungs, the most significant findings related to treatment were inflammation, alveolar histiocytosis and fibrosis. These lesions were most prevalent among rats receiving UCON® Lubricant 50-HB-5100 (reduced and non-reduced). Fewer lung lesions were observed in rats dosed with 50-H-5100 or 75-H-1400. Relatively little lung pathology was associated with the 50-HB-260, 50-HB-660 or 50-HB-2000. Thus, the higher molecular weight samples were the most injurious to rat lungs, with decreased incidence of lung lesions for lower molecular weight materials.

Results from this study indicate that the several UCON® Lubricants tested were somewhat less toxic by the intravenous route than the endotracheal route (as reported previously; Report 52-53, 1989). However, the observed lung pathology suggests that this organ is the site of significant toxicologic action following either route of administration (and possibly the cause of death), especially for higher molecular weight materials.

INTRODUCTION/OBJECTIVES

In previous studies conducted at BRRC, a large number of UCON® Lubricants have been evaluated for acute toxic effects. Although most were not remarkably toxic by the oral or dermal routes, some appeared to be relatively toxic by inhalation. In the inhalation work, rats were exposed to aerosols of selected UCON® Lubricants. The studies ranged from acute exposures to 13-week exposures. Pulmonary lesions were observed and their severity was related to molecular weight. Moreover, endotracheal injection of several of these lubricants produced deaths following relatively low dosages (especially with materials of low molecular weight and/or high water solubility). Most of the samples tested endotracheally proved to be injurious to lung tissue.

To determine the toxicity (including LD50s) and to again evaluate potential lung injury, rats were subjected to single intravenous injection of a series of UCON® Lubricants. The animals were examined for signs of systemic toxicity, gross pathology and microscopic lung pathology.

SAMPLES

Seven UCON® Lubricants were received from P. L. Matlock, Union Carbide Chemicals and Plastics Company Inc., Tarrytown, NY. Commercially available sterile saline (0.9% sodium chloride) was obtained from RICCA Chemicals. This solution was used, as necessary, to dilute the test materials.

Detailed sample information is presented in Table 1. No chemical content analyses on these materials or their dilutions were performed by BRRC. Dilutions of the liquids (when required) were made on a volume/volume basis. Dilutions were prepared each day as needed and mixed on a magnetic stirrer for several minutes before dosing and during dosing.

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Project Report 54-1
BRRC Number 88-22-70712
72 Pages

Pharmacokinetics of Tergitol® 24-L-60N After a Single Dose in Rabbits and Rats: Species and Dose Route Comparisons

Sponsor: Industrial Chemicals Division
Union Carbide Chemicals and
Plastics Company Inc.

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SUMMARY

The pharmacokinetic fate and tissue distribution was determined for radioactivity derived from ^{14}C-labeled-Tergitol® 24-L-60N (CAS Number 68439-50-9) after a single dose by three administration routes in male New Zealand White rabbits (0.005-0.5 ml/kg) and male Fischer 344 rats (0.025-0.5 ml/kg). This was done to determine pertinent differences that may exist in the manner in which each species handles an exposure to Tergitol. Radiolabeled-Tergitol® 24-L-60N was administered by the intravenous, oral and cutaneous routes, and plasma and excreta levels were examined 48-96 hr post-dosing. The time-course of Tergitol tissue distribution was also examined after oral and cutaneous administration of in both species. For both rats and rabbits, urine was the major route of excretion for Tergitol-derived radioactivity by all three routes of administration. Expired CO_2 amounted to about 3-9% of the administered IV or oral doses in rats, indicating that some metabolism of Tergitol occurs in this species. Tissue and volatile radioactivity recoveries accounted for only very minor amounts of the administered dose in either species. However, uptake of radioactivity by sciatic nerve showed a sustained, very high concentration relative to the plasma following cutaneous Tergitol applications to rabbit skin and was consistent with cutaneous results for sciatic nerve in the rat. This uptake seemed to correlate with the observance of neurobehavioral episodes following single oral and cutaneous doses in the rabbit. The estimated cutaneous dose absorbed by rats was about 15-20% between the 0.025 and 0.5 ml/kg dose levels, with approximately 68-80% of the applied radioactivity recovered as unabsorbed dose. The total dose absorbed after oral intubation was estimated to be 88-92% in rabbits. The estimated cutaneous dose absorbed in rabbits was about 29-33% between the two dose levels determined, with approximately 58-67% of the applied radioactivity recovered as unabsorbed dose.

Pharmacokinetic parameter estimation for Tergitol-derived radioactivity concentrations in the plasma were conducted for both species by all three routes of administration used in this investigation. The loss of ^{14}C from the

plasma with time was biphasic for the IV data in both species. In the rabbit, however, a somewhat slower terminal (β) disposition phase ($t_{1/2}^{\beta}$=24.8 hr) observed as compared to the rat ($t_{1/2}^{\beta}$=16.1 hr). The absorption of radioactivity from the gut was rapid ($t_{1/2}^{abs}$=0.5-1.5 hr) after oral intubation in the rat. For the orally-dosed rabbits, the absorption of radioactivity from the gut ($t_{1/2}^{abs}$=0.1-0.7 hr) was even more rapid than it was in the rat, while elimination from the plasma followed a faster time-course than it did in the rat. After cutaneous dosing in rats, penetration of radioactivity through the skin was not quite as rapid ($t_{1/2}^{abs}$=6-10 hr) as it was for oral absorption in rats, while elimination from the plasma for both the oral and cutaneous routes followed a slower time-course ($t_{1/2}^{\beta}$=29-33 hr) than for elimination after IV doses rats. For both of the cutaneously-applied dose levels in rabbits, a very rapid time-course for absorption through the skin was observed ($t_{1/2}^{abs}$=0.4-0.6 hr), while the terminal (β) phase reflected the extended time-course ($t_{1/2}^{\beta}$=35-36 hr) for clearance from the plasma that was seen for the IV route. Overall, it was concluded that the distribution of radioactivity to tissues appeared to follow a different pattern after percutaneous absorption than after oral ingestion for both species. In summary, radioactive disposition data has been acquired for two test species which may provide preliminary interpretive information for the evaluation of Tergitol® Nonionic Surfactant 24-L-60N toxicity.

INTRODUCTION

Acute toxicity and primary irritancy studies have been conducted on Tergitol® Nonionic Surfactant 24-L-60N at BRRC (Project Report 49-153). The studies indicate a distinct pattern of toxicity in rabbits characterized by gross and microscopic pulmonary lesions and delayed deaths following a single percutaneous exposure. Tergitol® 24-L-60N was considered to be of moderate acute toxicity (male rabbit LD50 = 0.93 ml/kg, female rabbit LD50 = 1.78 ml/kg) and a severe skin and eye irritant. Single application, percutaneous studies in rats and rabbits were conducted to characterize the time course for the development of toxicity from Tergitol® 24-L-60N (BRRC Reports 51-60 and 51-79). Within three days after application, these studies indicated pulmonary lesions in rabbits and the potential for neurotoxicity in rats 48 hr after administration.

In view of the moderate acute toxicity of this test substance and the evidence for delayed deaths and specific organ toxicity, it was considered appropriate to examine both the pharmacokinetic fate and tissue distribution of Tergitol® 24-L-60N in order to determine the important differences that may exist in its disposition for rats in comparison with rabbits. Therefore, the objective of this study was to characterize the pharmacokinetic fate of Tergitol® 24-L-60N after a single dose by several routes of administration in male New Zealand White rabbits and male Fischer 344 rats. Radiolabel doses were administered by the intravenous, oral and cutaneous routes. Plasma and excreta levels were examined at 48-96 hr following these intravenous, oral and cutaneous administrations. Tissue distribution was also examined at various times after the oral and cutaneous dosings. Prior to definitive studies, probe studies were conducted to determine whether $^{14}CO_2$ was generated by metabolism of the test substance and to determine the appropriate levels of ^{14}C to use for quantification in plasma and excreta. The probe studies are summarized in Appendix 1 and the definitive

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Project Report 54-80
BRRC Number 91-13-18265
15 Pages
August 22, 1991

SOLVACTANT™ 7 Solvent

Determination of Mutagenic Potential in the Salmonella/Microsome (Ames) Assay

Sponsor: Solvents and Coatings Materials Division
Union Carbide Chemicals and
Plastics Company Inc.

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SUMMARY

SOLVACTANT™ 7 Solvent (SOLVACTANT™ 7, CAS Number Not Available) was tested for potential mutagenic activity using the Salmonella/microsome bacterial mutagenicity assay (Ames test). Test doses for the Ames test were chosen from data obtained in a preliminary cytotoxicity study with strain TA100. SOLVACTANT™ 7 was nontoxic to strain TA100 at doses of 5.0 mg/plate or less, both in the absence and in the presence of an S9 rat liver metabolic activation system. Sparse background lawn growth and a significant reduction in the number of revertant colonies per plate were observed at 10 mg/plate SOLVACTANT™ 7, both in the absence and in the presence of S9 activation. On the basis of the preliminary cytotoxicity study, 5 dose levels of SOLVACTANT™ 7 ranging from 0.10 to 10 mg/plate, both in the absence and in the presence of metabolic activation, were chosen for the mutagenicity study.

No mutagenic activity was observed in any of the five strains tested, either by evidence of a dose-response relationship or a doubling of the mean number of colonies over the mean solvent control value, either in the absence or in the presence of S9 activation. These results were confirmed in an independent test. Therefore, SOLVACTANT™ 7 was not considered mutagenic under the conditions of this in vitro screening test.

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Project Report 54-89
BRRC Number 91-13-11300
16 Pages
October 11, 1991

SOLVACTANT™ 7 Solvent:

Acute Toxicity and Primary Irritancy Studies

Sponsor: Solvents and Coatings Materials Division
Union Carbide Chemicals and Plastics Company Inc.

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SUMMARY

Rat peroral toxicity, rabbit percutaneous toxicity, rabbit skin irritancy and rabbit eye irritancy tests were completed on SOLVACTANT™ 7 Solvent (CAS No. 132299-20-8). The procedures followed for these tests were based on current EPA Toxic Substances Control Act (TSCA) Health Effects Test Guidelines. Results from the study, expressed in terms of sample as received, are as follows:

Peroral, Rat (Fasted)
Males: LD50 = 2.46 g per kg of body weight (b.w.)
Females: LD50 = 1.07 g per kg b.w.
Combined: LD50 = 1.62 g per kg b.w.

Percutaneous, Rabbit (24-Hour Occluded)
Males: LD50 = 9.51 g per kg of body weight (b.w.)
Females: LD50 = 11.3 g per kg b.w.
Combined: LD50 = 10.5 g per kg b.w.

Skin Irritation, Rabbit (4-Hour Occluded)
Minor erythema on 4 of 6 rabbits, no edema or other irritation on any of 6 from 0.5 ml. Irritation subsided after 2 to 3 days.

Eye Irritation, Rabbit
Minor to moderate corneal injury (opacity) in 6 of 6 rabbits (with vascularization in 4), iritis in 6, moderate conjunctival irritation in 6 (with a purulent discharge in 2) from 0.1 ml. Irritation persisted in 3 eyes at 21 days.

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Project Report 54-90 (Revised)
BRRC Number 91-13-11300
9 Pages
November 8, 1991

SOLVACTANT™ 7 Solvent:

Acute Inhalation Toxicity and Primary Eye Irritancy Studies

Sponsor: Solvents and Coatings Materials Division
Union Carbide Chemicals and
Plastics Company Inc.

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SUMMARY

SOLVACTANT™ 7 Solvent (CAS No. 132299-20-8) was evaluated for acute inhalation toxicity in the rat and ocular irritancy in the rabbit using standard BRRC methods. Additional tests (including rat peroral toxicity, rabbit percutaneous toxicity, skin irritancy and eye irritancy) were also completed according to EPA Toxic Substances Control Act (TSCA) Guidelines and were reported separately (BRRC Project Report 54-89). Results for this study are as follows:

Inhalation, Rat; Substantially Saturated Vapor (Static at 23°C)
Males: 6.0 hours killed 0 of 5.
Females: 6.0 hours killed 0 of 5.

Eye Irritation, Rabbit
Minor to severe corneal injury with vascularization in 6 of 6 eyes (including an irregularly-shaped cornea in 1), iritis in 6, moderate to severe conjunctival irritation in 6 (with a purulent discharge in 2) from 0.01 ml; only 1 eye healed by 21 days. Minor to moderate corneal injury in 5 of 6 eyes (including transient vascularization in 4), iritis in 6, moderate conjunctival irritation in 6 from 0.005 ml; all healed by 14 to 21 days.